The MINING CONGRESS JOURNAL

Volume 17 JANUARY, 1931 No. 1

PRESENTING

Reviews of the Mining Industry in Various Districts of the United States for 1930

Prospects for the Copper Industry

Mining Methods and Costs at the Argonaut Mine

▲ ▲ ▲

American Mining Congress Holds Successful Group Conferences

Hidden Gas Springs

▲ ▲ ▲

A Survey of Mechanized Mining for 1930

Adopting Mechanical Mining at the Hanna Coal Company

Aersand Coal Cleaning Plant of the Allegheny River Mining Company

Economic Losses in Pennsylvania Mining Industry Resulting from Injury

Legislative Review

Contributors

Wm. A. Willis, Chas. F. Willis, C. L. Colburn, G. C. Brown, A. G. Mackenzie, J. F. Woodbury, M. D. Harbaugh, J. C. Adkerson, A. H. Willett, E. W. Parker, Benedict Shubart, C. M. Schloss, H. E. Nold, Geo. Heaps, Jr., S. C. Higgins, R. E. Howe, K. F. Treschow, C. J. Neekamp, J. L. Davidson, Carl Scholz, G. B. Southward, R. V. Clay, Chas. M. Means, R. N. Hosler, Wm. O. Vanderburg.

"TRUST IN GOD - - - BUT KEEP YOUR POWDER DRY"

CROMWELL

OLIVER CROMWELL—stern leader of a desperate people against the tyrannical aristocracy of his time—had to combat carelessness among his poorly trained soldiers; even though they well knew that defeat in battle meant death at the hands of their adversaries.

In like manner the mine officials of today must combat carelessness among the men for whose safety they are responsible in an industry where one man's negligence may easily bring disaster to many others. Unremitting vigilance, day and night, is the price of safety underground.

As the oldest and largest manufacturer of Safety Fuse we are vitally interested in the enforcement of correct blasting methods. When proper precautions are taken the shooting of coal is safe; but if care is not exercised at every step a hazard exists—no matter what explosives are used or how they are fired.

And fuse, as well as powder, should be kept dry.

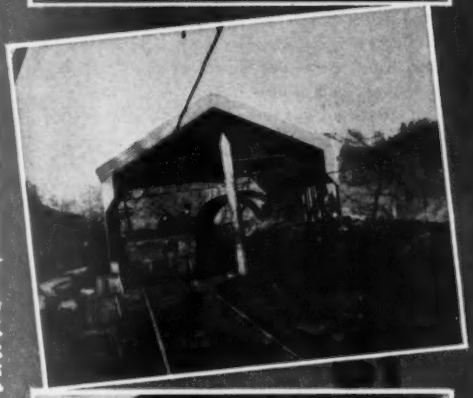
DoNot "Short Fuse" --Fuse should be cut long enough for the end to extend well out of the mouth of the bore hole when the primer cartridge is in place.

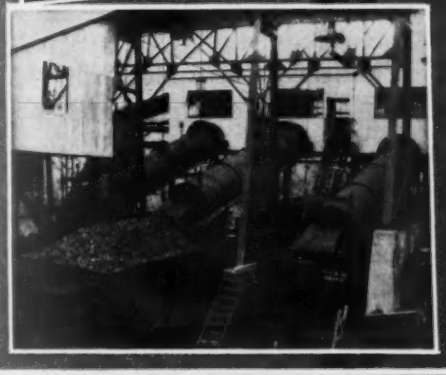
All holes should be well tamped.

THE ENSIGN-BICKFORD CO. 1836 SAFETY FUSE 1930 SIMSBURY CONN.

THE ENSIGN-BICKFORD CO.

SIMSBURY CONNECTICUT





RS AND COMPANY

Clinchfield Coal Corp.'s newest tipple, Moss No. 7 at Clincho, Va., the latest RandS installation, features the modern in coal preparation equipment.

This 300-ton-per-hour, three track, all steel tipple loads out four sizes—Lump, Egg, Stove and Slack.

An RandS Rotary Car Dumper and Car Feeder unload cars at dump house into a rope and button retarding conveyor. Coal is conveyed to the tipple where a Marcus Picking Table with Side Wings for Egg picking screens and handles the coal to three-belt loading booms. Three-inch screenings are by-passed and screened over four Arms Horizontal Vibrating Screens which are located in a separate building where 3″ x 1½″ Stove and 1½″ x 0″ Slack are made, the Slack being elevated to a 100-ton storage bin.

Designed for high speed, economical handling and preparation, this installation, the fifth of RandS design for the Clinchfield Coal Corporation, bears witness of the acceptance accorded RandS design and engineering service.

ROBERTS AND SCHAEFER CO.

ENGINEERS and CONTRACTORS

PITTSBURGH, PA., 418 OLIVER BLDG. WRIGLEY BUILDING, CHICAGO HUNTINGTON, W. VIRGINA, 514 NINTH AVE.

THE MINING CONGRESS JOURNAL

VOLUME 17 JANUARY, 1931 No. 1

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COAL

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Economic Losses in Pennsylvania Bituminous Industry Resulting from Injury

METAL

Mining Methods and Costs at the Argonaut Mine

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Pouring a heat of Acid Steel
for Roebling Wire Rope

THE MOLTEN METAL has been tapped into a huge ladle. And now it is being poured into the molds. Soon, in the form of ingots, it will be on its way through a seemingly endless number of processes. Finally it will be shipped out as Roebling "Blue Center" Steel Wire Rope.

Roebling Quality starts with the making of the steel and is Roebling-controlled every step of the way. It is the result of highly developed, modern production methods plus close attention to detail.

Throughout the 48 states, millions of feet of Roebling "Blue Center" Steel Wire Rope are daily demonstrating the safety and economy assured by Roebling Quality in every type of service.

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ROEBLING "BLUE CENTER" STEEL **WIRE ROPE**

Allis-Chalmers Double Drum Electric Hoist *purchased for*

Junction Shaft

Calumet and Arizona Mining Company

This is the fourth electric hoist for this prominent mining company and again an Allis-Chalmers unit has been selected.

Specifications of New Hoist:

Maximum Rope Pull.....44,000 lbs.
Maximum Speed.....2,000 ft. per min.
Maximum Hoisting Depth.....5,000 ft.
12-ft. x 6-ft. Welded Plate Steel Drums.
14-ft. Parallel Motion Post Brakes and Clutches, oil operated.
Hoist driven by 1,500 H.P., 440 R.P.M. Allis-Chalmers D. C. motor with 1,250 K.W. flywheel M-G set.
Safety devices, control and switchboard equipment furnished by Allis-Chalmers.

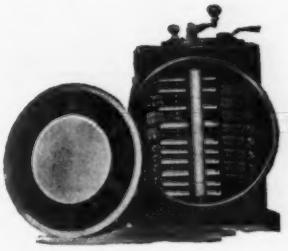
Maximum Loading:

Skip	8,000 lbs.	Ore in Skip....	11,000 lbs.
Two Cages	5,000 lbs.	5000 ft. 1½" Rope	20,000 lbs.

Mining and Metallurgical Equipment for
Concentrating Plants
Copper Converting Plants
Crushing Plants
Cyanide Plants
Refining Plants
Roasting Plants
Sampling Plants
Smelting Plants
Washing Plants
Including Motors and Other Electrical Machinery

ALLIS-CHALMERS
Allis-Chalmers Manufacturing Company, Milwaukee

Safety-



In Jeffrey Explosion-Tested Locomotives

Jeffrey Explosion-Tested Gathering Locomotive—made in both high and low types—has every safety feature it is possible to apply to a trolley type gathering locomotive.

All electrical parts are enclosed in explosion-tested compartments. Those which must be accessible are equipped with large screw type hand holes.

All wiring is carried in heavy air hose which bear on cable shields on the explosion-tested compartments.

The vertical cable reel has been developed especially for this locomotive. It has its own explosion-tested compartment, and the collection rings are in a separate explosion-tested compartment.

Cable trough extends lengthwise through locomotive under covers.

Low type, so far as we know, has the lowest overall height (*27"* with trolley on outrigger) of any similar locomotive built. Yet the motorman has plenty of room—can operate in comfort.

Eight ton. Rolled steel slab frames heavily riveted and braced. Two motors each 40 H.P. Drum type controller (explosion tested) incorporates both headlight switch and cable reel transfer switch. Magazine fuse box provides three available fuses without opening container.

Jeffrey 8-Ton Explosion-Tested Gathering Locomotive

The Jeffrey Manufacturing Company
958-99 North Fourth St., Columbus, Ohio

BRANCH OFFICES:
New York, Chicago, Philadelphia, Pittsburgh, Scranton, Pa., Charleston, W. Va., Birmingham, Denver, Salt Lake City

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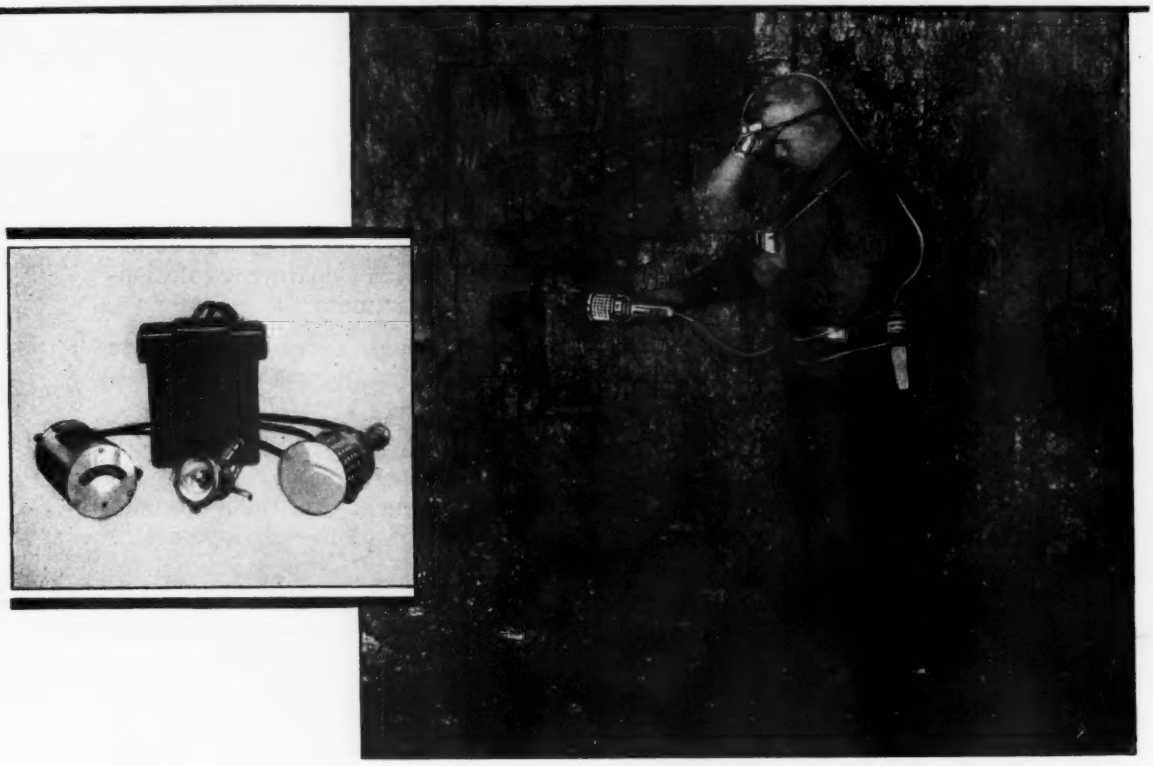
JEFFREY MFG. CO., LTD., OF CANADA: Head Office and Works, Montreal; Branch Office, Toronto; Service Station, 210 Ninth Ave., W., Calgary.

JEFFREY COAL MINE EQUIPMENT

An ounce of PREVENTION



NINETY-NINE per cent of accident prevention is in knowing when danger exists. But the most deadly of mine hazards — methane — gives the miner no warning of its presence. It is odorless and invisible. The miner cannot trust his senses, unaided, to tell him when the air around him is primed for a terrific explosion.

Careful and accurate testing for methane is the ounce of prevention that may mean the difference between safety and disaster. The U. C. C. Methane Indicating Detector measures the volume of methane present in air to an extremely accurate degree. It is carried into the atmosphere to be tested, and is easy to operate. It gives immediate warning of methane, and indicates the proportions in which it is present. The United States Bureau of Mines inspected and approved it as permissible equipment.

Return the coupon for a descriptive booklet. If you wish a demonstration, write or telephone the nearest District Office of Union Carbide Sales Company or E. D. Bullard Company.

Distributed by

THE LINDE AIR PRODUCTS COMPANY
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and

E. D. BULLARD COMPANY CHICAGO SAN FRANCISCO

The Linde Air Products Co., Safety Appliance Department, 30 East 42nd Street, New York
Please send me your booklet describing he U. C. C. Methane Indicating Detector.

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CONTINUOUS SERVICE

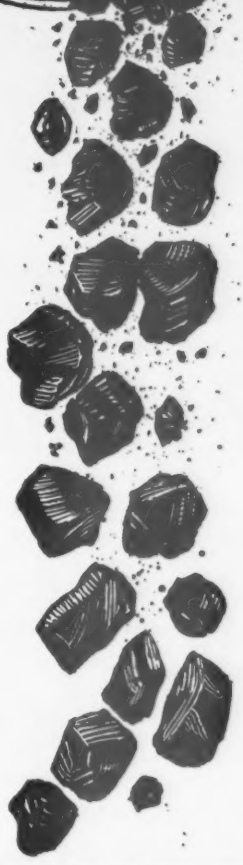
COSCO

Shaker CONVEYOR

Many hundreds of Cosco Conveyor installations in American coal mines —*and every one performing continuously and successfully.*

That is an eloquent testimonial to the correctness of Cosco design and the thoroughness of Cosco manufacture.

The Cosco Shaker Conveyor equipped with the "Duckbill" increases output per man and lowers maintenance costs to such a degree that losses easily change to profits.



Cosco's small first cost is soon saved by economies it makes possible throughout your mining operations. It can be applied under roof conditions where no other system can be used. It is the most elastic and most readily movable conveyor system known.

Built from American materials to American standards for American conditions.

Let our engineers present facts and figures on what the Cosco Drives and Troughing with "Duckbill" can accomplish in *your* mines.

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299 Broadway, New York

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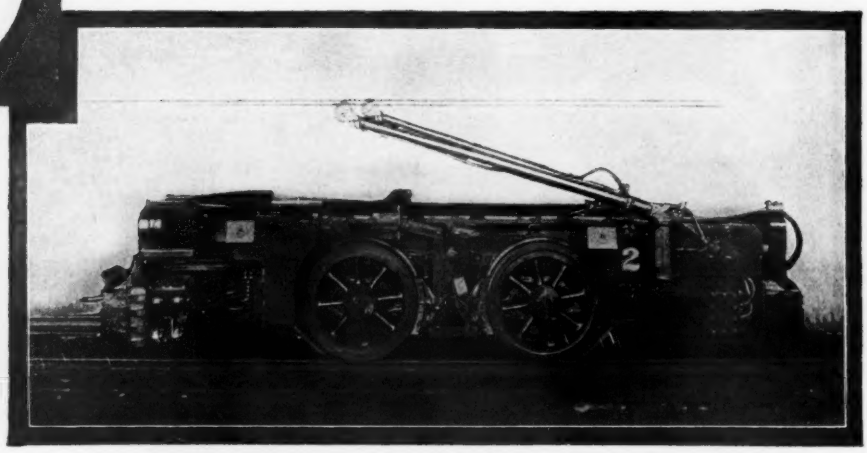
"Convey Your Coal The Cosco Way"

15

Baldwin-Westinghouse 8-ton Explosion-tested Locomotive for The Crab Orchard Improvement Co.



Fifteen aids to safer coal mining

WHEN The Crab Orchard Improvement Company of West Virginia sought gathering locomotives whose operation would not jeopardize the safety of their men and property, they selected the improved Baldwin-Westinghouse explosion-tested locomotive illustrated above. Their order for fifteen of these locomotives followed.

Baldwin-Westinghouse mine locomotives for gathering and haulage purposes are manufactured in various types and sizes.

The Baldwin Loco. Works, Philadelphia, Pa. ~ *Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.*

Baldwin-Westinghouse

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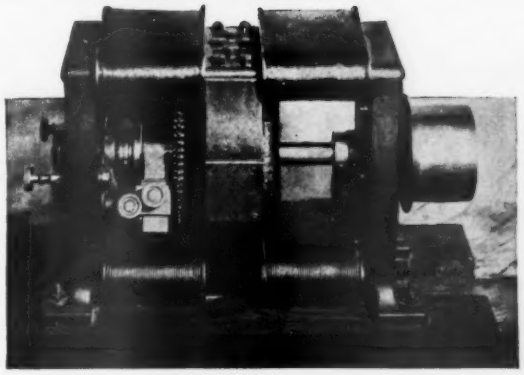
TUNE IN THE WESTINGHOUSE SALUTE OVER THE N. B. C. NATION-WIDE NETWORK EVERY TUESDAY EVENING.



Wood, 5-light arc dynamo

■

18750 *K. V. A.*, 6600-*volt water-wheel generator*

mill-wheels

THE old mill-wheel holds an honored place in our country's industrial history. But the mill-wheel has gone to make way for the more efficient hydraulic turbine and great hydro-electric plants distributing light and power to homes and factories for miles around.

As electricity began to force its way into the industrial world, certain names became associated with its progress. Among others is that of James J. Wood. The Wood dynamo is one of the many contributions made by this eminent engineer. It supplied the current for lighting the more progressive industrial plants.

Companies, as well as individuals, rose to positions of leadership during this era of transition. Due to the quality of its products, National Carbon Company, Inc., came to be recognized as a leader in carbon manufacture. National Carbon Brushes contributed in no small degree to the development and application of electrical power.

The canvas of the artist has preserved for us the old mill-wheel. The Wood arc dynamo shown on this page rests in a great museum. But both live again in the modern wheel of industry. Huge water-wheel generators, like that illustrated above, convert the water-power of our streams to the needs of industry. They are the mill-wheels of today.

The research facilities of National Carbon Company, Inc., have provided a brush for every requirement of electrical industry and assure the production of grades to meet the needs of the future. Systematic maintenance of equipment and National Pyramid Brushes keep the modern mill-wheels turning at minimum operating cost.

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide UCC *and Carbon Corporation*

Carbon Sales Division — SILVER STRAND CABLE TRADE MARK REGISTERED — Cleveland, Ohio

Branch Offices and Factories:

New York Pittsburgh Chicago San Francisco

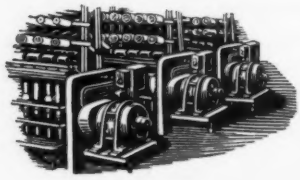
Keep thy Shop and [The Sayings of

thy Shop will keep thee Poor Richard]

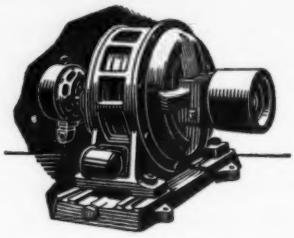
Just Published for 1931

AN Almanack

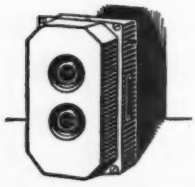
containing wise, thought-provoking suggestions for modernizing industrial plants and published in the firm belief that a penny spent on modernization to-day will be worth ten pennies spent to-morrow.



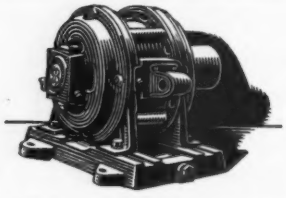
A certain group drive required 164 large bearings and 3600 feet of heavy belting. It was replaced by G-E individual direct-motor drive with 20 small bearings. Maintenance dropped from 65 cents to 12 cents per ton of product.



High power-factor is as beneficial to the plant as to the vendor of electricity. In many cases, the G-E sales engineer can show you how to pay for "leading-power-factor" synchronous motors out of the economies that follow their installation.

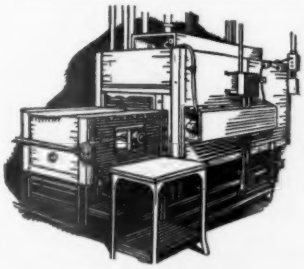


Instead of saying, "I can't use a synchronous motor here because I don't want it to stop at every voltage disturbance," call in the G-E sales engineer and ask him to show you the G-E time-delay devices which keep not only these motors, but all induction motors, on the line for all temporary voltage dips.

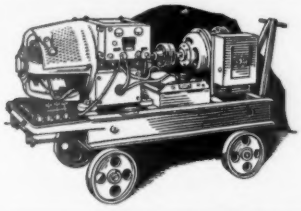


If power conditions in your plant will stand full-voltage starting, there are a number of G-E motors now available for this service that will greatly simplify your control equipment.

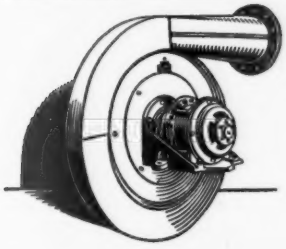
Continued bearing trouble was traced to an uninstructed night man who slapped off the belts by mishandling the starter and kept tightening them up to make them stay on. A G-E magnetic starter would have saved six months of trouble.



A New England manufacturing plant modernized its heat-treating department, at the suggestion of a visiting G-E heating specialist, by replacing four old fuel-fired, batch-type furnaces with a G-E automatic electric conveyor furnace. Handling costs dropped 60 per cent; production was tripled; the products were much improved; and the former high maintenance costs dropped out of the picture.

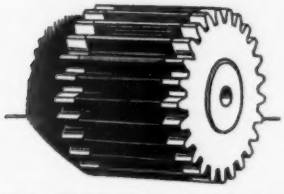


Hundreds of plants are getting "out of the red" and scores of little plants are growing big because they called in the G-E arc-welding specialist to help them modernize their products with arc welding—the greatest of modernization tools. It's almost impossible to strike an arc without improving design or cheating the scrap heap with a neat repair.



No better time to replace those old, inefficient blowers in the forge shop with modern G-E blowers that speed up production by maintaining uniform pressure on each furnace and reduce power costs because they are so efficient. Also, the operation of your cupolas can be greatly improved, and a substantial saving in coke effected, by installing a G-E cupola blower with automatic blast-gate control.

Give your plant engineer some G-E Thyratron or photoelectric tube equipments to play with and you'll be surprised at the number of places where he can use them to speed production, simplify control, and cut costs.

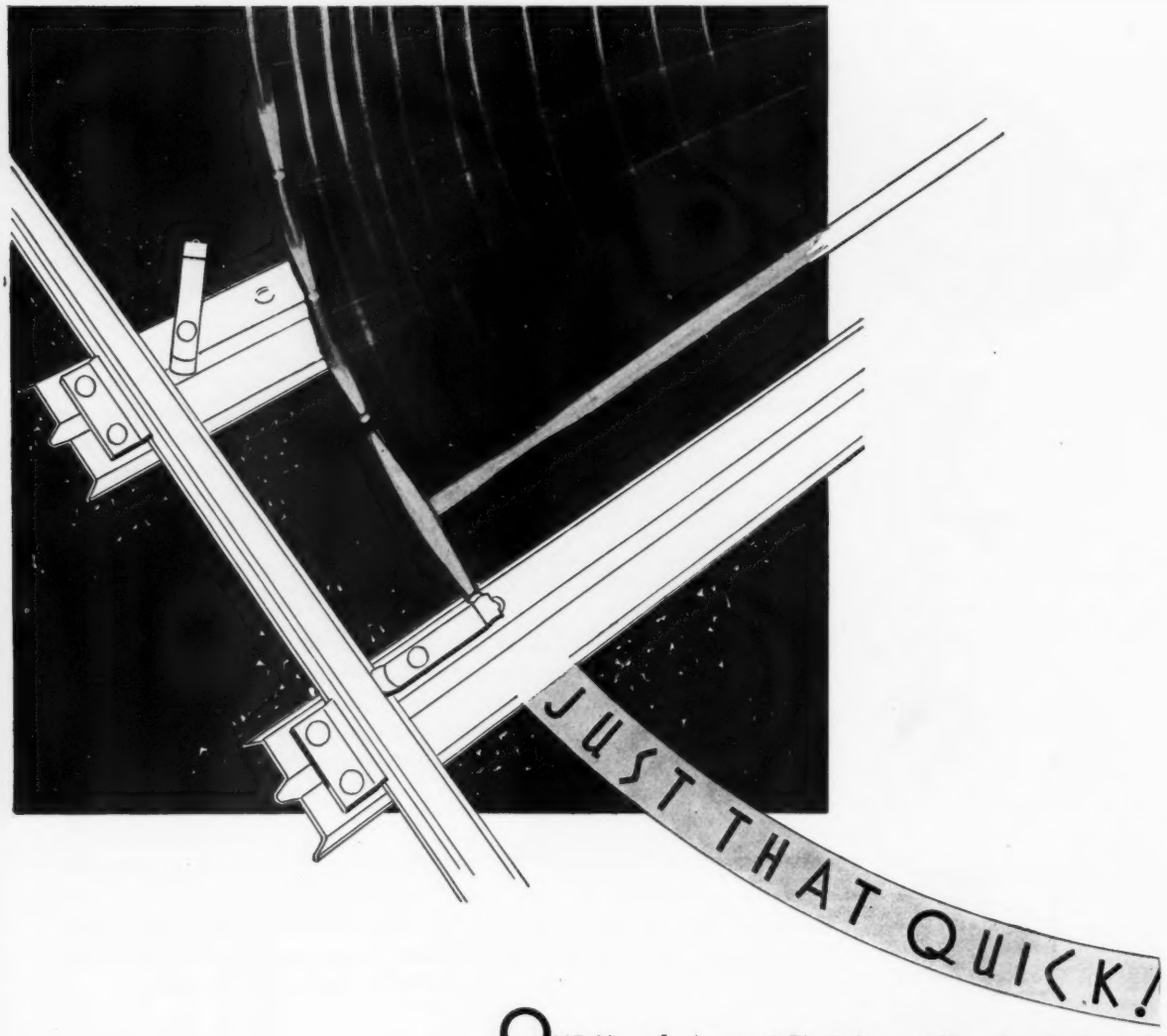


After you've replaced a stripped pinion on a motor shaft a few times, ask the G-E sales engineer to send you a Fabroil or a Textolite pinion. They outlive most other pinions by wide, wide margins. They practically eliminate noise, too.

Modernization Reduces Costs — Increases Profit

There are any number of ways in which the G-E sales engineer can help you to modernize. Ask him about them when he calls; or write the nearest G-E office.

GENERAL ELECTRIC 200-426



ONE blow of a hammer! That's how quickly and easily Carnegie Copper Steel Mine Ties may be laid. The outside fastening is securely riveted to the tie. The inside clip clinches the rail, insuring true-to-gauge construction. No special tools or fittings are necessary in laying the ties. Merely a hammer blow to lock the clip!

Carnegie Copper Steel Mine Ties are efficient tools of modern mining. They are rust-resistant, thus assuring a much longer life than ordinary steel ties can give. They are made in a number of styles and sizes, varying from 2½ to 9 pounds per foot, and from 1 1/16" to 2¼" in height. There are light ties for room work and heavy ties for main haulage . . ties for soft bottom and ties for low ceiling. A variety of clips and fastenings is also available. Our catalogue tells the whole story. Send for your copy today.

A very popular Carnegie Tie is M-26A with double locking clips, pictured above. Many prefer the double clips which insure a firmer grip on the tie.

CARNEGIE STEEL COMPANY - PITTSBURGH

Subsidiary of United States Steel Corporation

113

CARNEGIE COPPER-STEEL MINE TIES

JOY

CLOSE TIMBERING

THE ability of the JOY machines to operate under close timbering conditions is another proof of their all around adaptability to their jobs. Their flexibility permits their use under all methods of mining—entry development, room, pillar, modified and long wall production. These loaders are compact, flexible, easily controlled and capable of sustained output at two or more tons per minute. They are quickly moved from place to place under their own power. There are installations near you. Let us tell you where. Our representative will be glad to give you an estimate of the possibilities and costs of JOY production at your mine, without obligation to you. Write for further information.

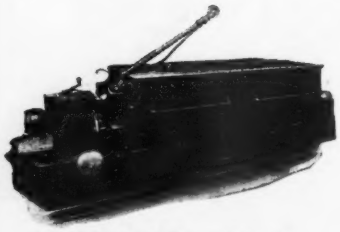
JOY MANUFACTURING Co., Franklin, Penna.

Whatever Your Need,

For Whatever Haulage Condition—

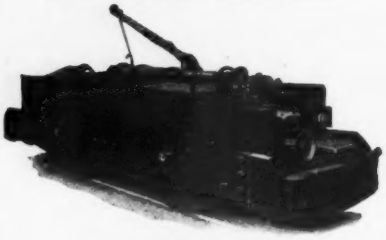
There's a Goodman Locomotive

Every Goodman
Mine Locomotive
is
Built and Equipped
to Suit Exactly
Its Service Requirements

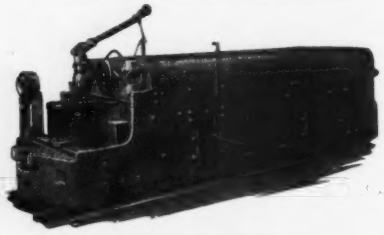


6-Ton Comb. Trolley and Battery. Enclosed Electrical Parts.

24-in. Low Vein Gatherer. 6 Tons. 2 Motors. Ample Clearance.



8-Ton Haulage Locomotive. Over-motored. Double End Control.

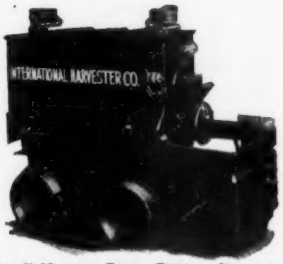


13-Ton Haulage Locomotive. 24-in. Gauge.

15-Ton Main Haulage Locomotive. Ample Clearance. Spring Bumpers.

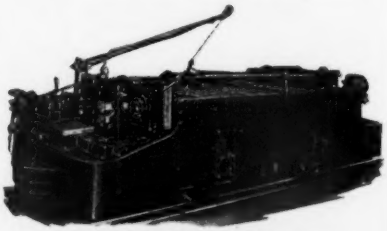
Features:

- Open and enclosed electrical construction.
- One, two and three motors.
- Standard, over-motored and super-motored.
- Trolley, battery and combination types.
- All trolley and battery voltages.
- Deck heights to suit headroom available.
- Drum or semi-magnetic control.
- Slow-speed motoring for gathering.
- Single and tandem operative units.
- Transverse equalization for good track performance.
- Rigid frames, with spring bumpers when desired.
- Inside or outside frame construction.
- Single and double end control.
- Narrow and wide track gauges.
- Electric cable and wire rope gathering reels.
- Ample roadway clearance.
- Ample cab space.
- Spring mounted headlights.

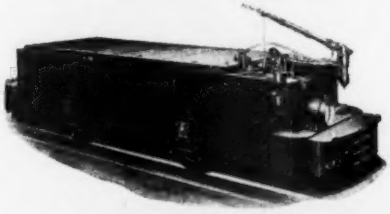


Small Narrow Gauge Battery Trammer. Four-wheel Drive. Single Motor. Complete Battery Locomotive Equipment. Telescoping End Cab.

4 or 5 Ton Low Vein Gatherer. Four Wheel Drive. Slow Speed Motor.



8-Ton Safety Gathering Locomotive. Enclosed Elec. Parts. Contactor Control.



10-Ton Main Haulage Locomotive. Supermotored. Air Sanders.

20-Ton Main Haulage Locomotive. Three Motors.

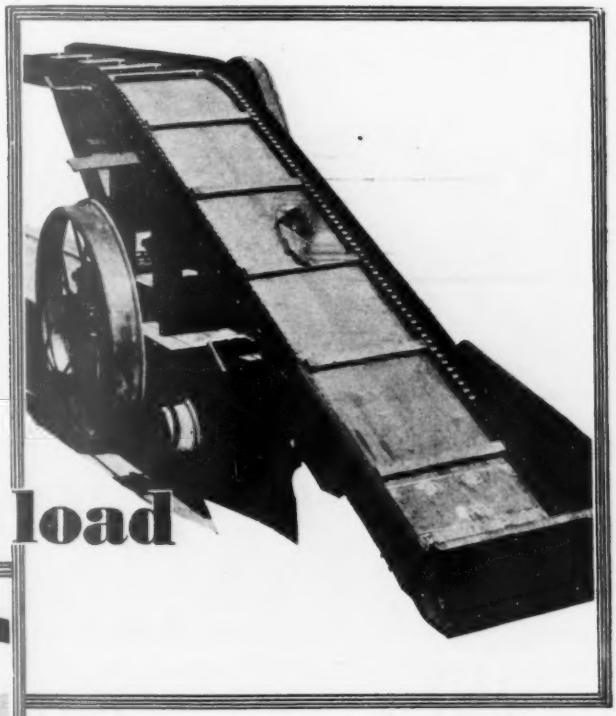
GOODMAN MANUFACTURING COMPANY

HALSTED ST. at 48TH.
CHICAGO - - - ILL.

Locomotives - Loaders - Coal Cutters

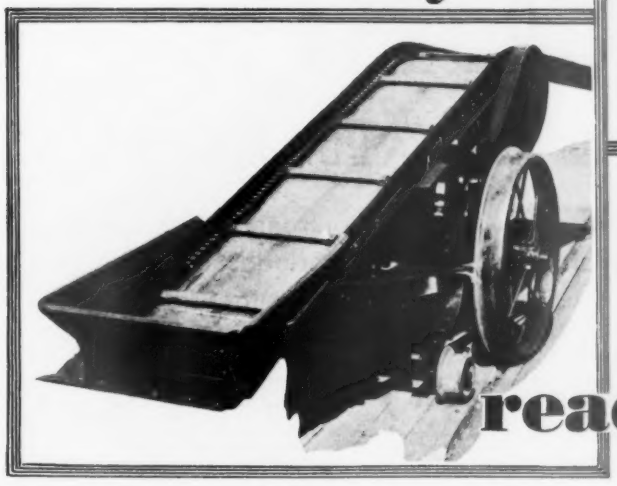
PITTSBURGH—WILKES-BARRE—HUNTINGTON, W.VA.—BIRMINGHAM—ST LOUIS—DENVER—PRICE, UTAH

(48)



IN A SECOND

ready to load



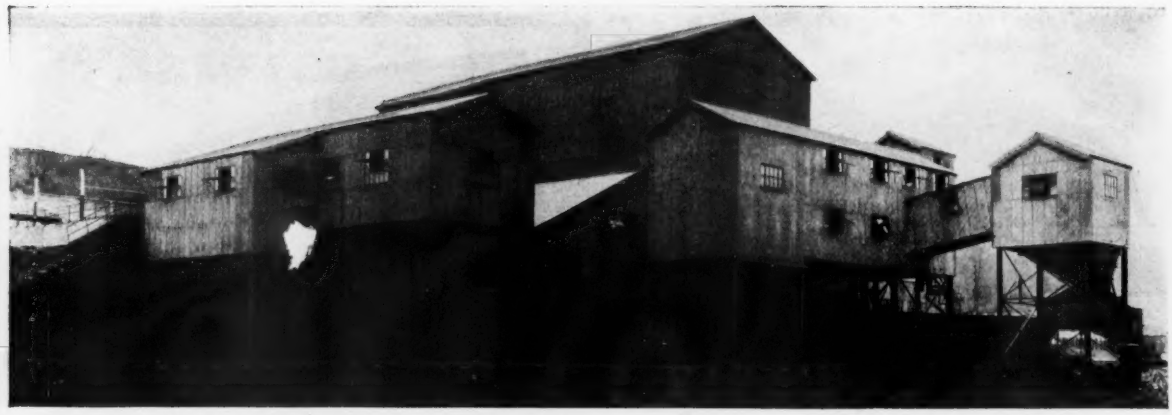
or

ready to move

SPEED of moving from place to place and strength and time saved in operation add much to the profits of coal production. The Mt. Vernon pit car loader is ready to move in an instant—or ready to load. Drop the pony truck in front and it rests on four wheels or snap it back out of the way and the hopper is ready for coal. Time, strength and temper are saved.

Other features of the Mt. Vernon are on a par with this efficient device that simplifies handling. The sturdy and rigid frame is constructed of Z-bars firmly bolted together. All parts are readily accessible, ball bearing housings are packed and sealed with grease so that they require no further lubrication. These are some of the advantages in handling and construction of these sturdy loaders. Let us tell you more about them and about the ease with which they fit into the mining system, lighten burdens and speed coal production. Made to fit your specifications and your mining needs. The Mt. Vernon Car Manufacturing Company, Mt. Vernon, Illinois.

MT. VERNON PIT CAR LOADERS



Peale Davis "Pneumo Gravity" Plant of the Consolidation Coal Company, Acosta, Pa. — 350 tons per hour capacity.

FAIRMONT

MINE EQUIPMENT INSTALLATIONS

At this season of the year when coal producers are confronted with the problems arising from wet-washed coal, such as frozen carloads and dissatisfied customers, it is advisable to consider the proved advantages of the

Peale Davis System of Dry Cleaning

All sizes of coal from 6 inches down to dust can be handled on one table without the expense, machinery and labor required by the old-fashioned wet process.

Other Advantages: One primary table of large capacity eliminates presizing, multiple screening units, balancing hoppers, distributing and collecting conveyors, reassembly and resizing of cleaned products:—thus simplifies the plant, reduces breakage, insures uniform cleaning unaffected by normal variations in the product coming to the cleaning plant; lower power, maintenance, and operating costs. The use of a retreatment table insures maximum recovery of clean coal, and minimum bank losses.

We have recently installed Peale-Davis systems for

Lincoln Gas Coal Company, Washington, Pa.,	Cleaning	375	tons	per	hour
Consolidation Coal Co., Acosta, Pa.	"	350	"	"	"
Carbon Fuel Co., Carbon, W. Va.	"	250	"	"	"
Jamison Coal & Coke Co., Crabtree, Pa.	"	150	"	"	"
Also now under construction a repeat order from Jamison Coal & Coke Co., Hannastown, Pa., to clean		350	"	"	"

FOR FURTHER INFORMATION WRITE

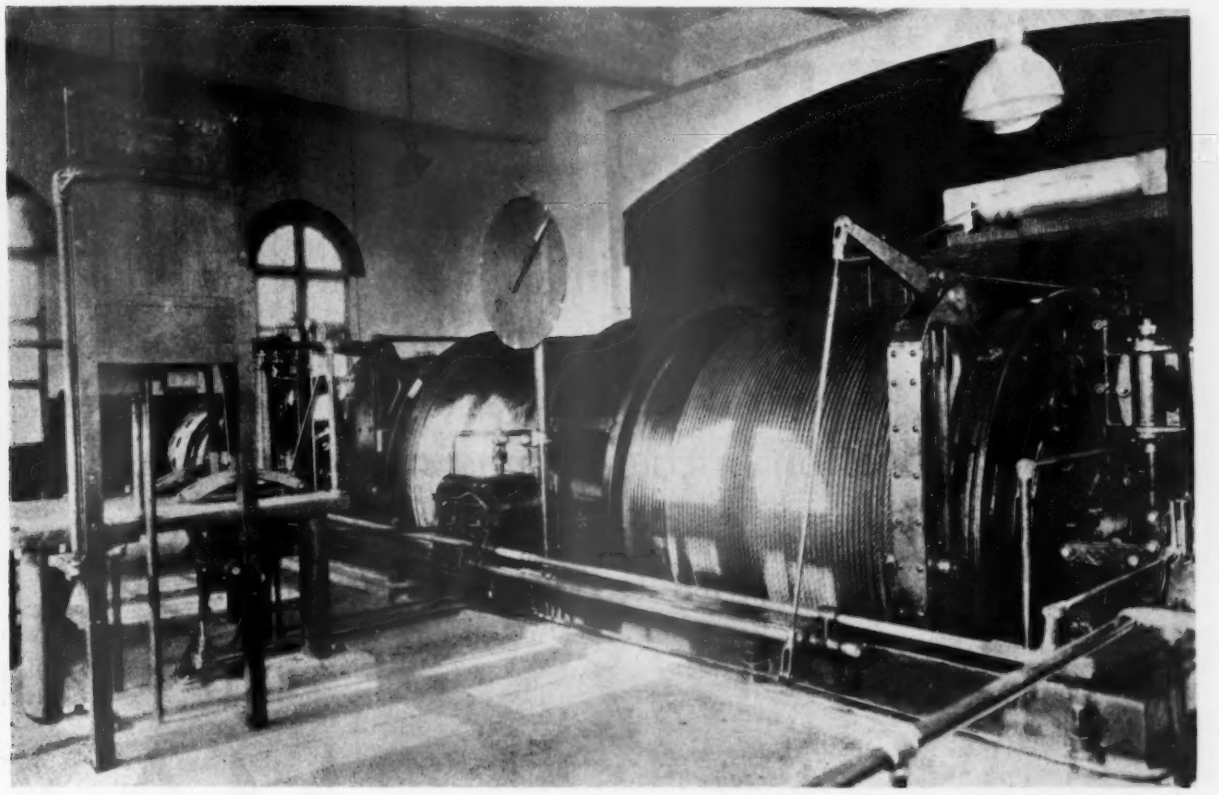
FAIRMONT MINING MACHINERY COMPANY

FAIRMONT, WEST VIRGINIA

Branch Offices: New York, 15 Broad St. Pittsburgh Huntington, W. Va.

PUMPS TIPPLES CONVEYORS CAR RETARDERS SCREENS CAR HAULS PICKING TABLES

PEALE DAVIS DRY CLEANING PLANTS



The 600 H.P. Hoist above is installed at the Loomis Colliery of the Glen Alden Coal Company at Nanticoke, Pa. Its characteristics are as follows: tight and loose drums, 10′ 0″ diameter, 8′ 10″ face; drum shaft bearings 15″ x 26″; center bearing 16″ x 26″; drum shaft—16″ diameter; depth of shaft—1,600 feet; weight of cage—13,000 lbs.; weight of car—3,000 lbs.; weight of coal—8,000 lbs.; diameter of rope—1½″; rope speed—2,200 ft. per minute.

ADVANCED engineering practice, high-grade materials and careful workmanship have built the reputation of the Vulcan Iron Works. These qualities are responsible for the world-wide use of Vulcan mining equipment. Whether it is a steam locomotive or a shaking conveyor; a great kiln or a small casting; a mine fan or a scraper loader the same care, the same thoroughness of design goes into every machine turned out. In every mining field will be found old Vulcan equipment that has been serving faithfully for many years or new Vulcan equipment that has kept full pace with the advances in mining practice.

We will be glad to correspond with you about any equipment problem in coal or metal mining. Bulletins upon request. Remember that Vulcan covers practically the full gamut of mining and has back of it the practical experience and resources of a great manufacturing organization established for over 80 years.

VULCAN IRON WORKS, Wilkes-Barre, Penna.

VULCAN of WILKES-BARRE HOISTS

Announcing the

Bigger and better—depression or no—the demand coming in after the first announcment is for larger exhibition spaces for the 1931 exposition. The growing necessity for reduction in coal mining costs has brought out many new developments and refinements in mining practice and equipment. These

HELD AGAIN

MAY 19

THE AMERICAN

Coal Convention

will be presented to coal mining men at this convention and exposition. The growth during the last seven years of this annual coal event is proof of its great practical value. Plan now to be there and to send your key men to this short course in improved mining practice.

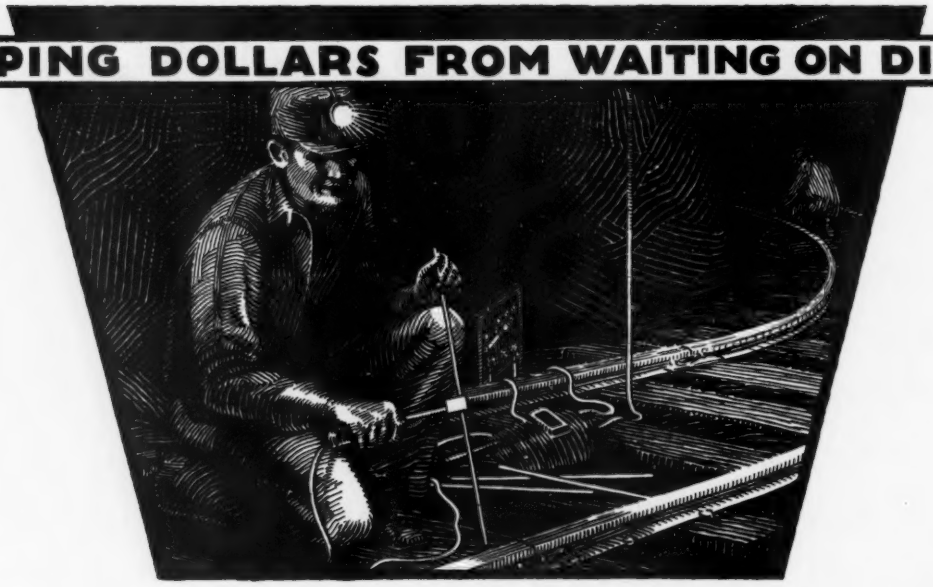
IN CINCINNATI

11-15

31

MINING CONGRESS

KEEPING DOLLARS FROM WAITING ON DIMES



Save the Rod and Spoil the Weld

SAVING a few pennies on the original cost of welding rod often means the difference between good low-resistance bonded joints and poor joints which dissipate hundreds of dollars in wasted current—"dollars waiting on a dime".

Isn't it much better to buy the right rod, rod made especially for the bonding job, and be assured of good sound welds? Men who mine for profit know this to be so. Selecting a welding rod like O-B Rod is a paying practice. O-B Rod is made especially for good bonding. This better rod contains a powerful deoxidizing agent which eliminates all tendency toward porous welds. The flux also helps to clean the rail surface, aiding the welder to secure a strong and sure weld. If you want to "keep dollars from waiting on dimes", if you have an earnest desire to stop power losses in return circuits, this rod will prove a most valuable aid to your reaching these ends.

Ohio Brass Company, Mansfield, Ohio
Canadian Ohio Brass Co., Limited
Niagara Falls, Canada
1240M

Easier Work For The Welder

Every bonding man is favorably impressed with the ease and smoothness with which O-B Welding Rod flows. Page 68, O-B New Products Supplement No. 4 gives the ordering information.

Ohio Brass Co.

NEW YORK PITTSBURGH CHICAGO CLEVELAND ST. LOUIS ATLANTA DALLAS
PHILADELPHIA BOSTON LOS ANGELES SAN FRANCISCO SEATTLE

PORCELAIN INSULATORS
LINE MATERIALS
RAIL BONDS
CAR EQUIPMENT
MINING MATERIALS
VALVES

AERSAND *is now cleaning the small coal at this plant*

Cadogan Plant, Allegheny River Mining Co., Cadogan, Pa.

The first commercial Aersand Cleaning plant was placed in operation at Cadogan in September, 1930. The coal is separated from the refuse by the simple Float-and-Sink principle using a heavy dry fluid—Aerated sand —A new principle in dry cleaning.

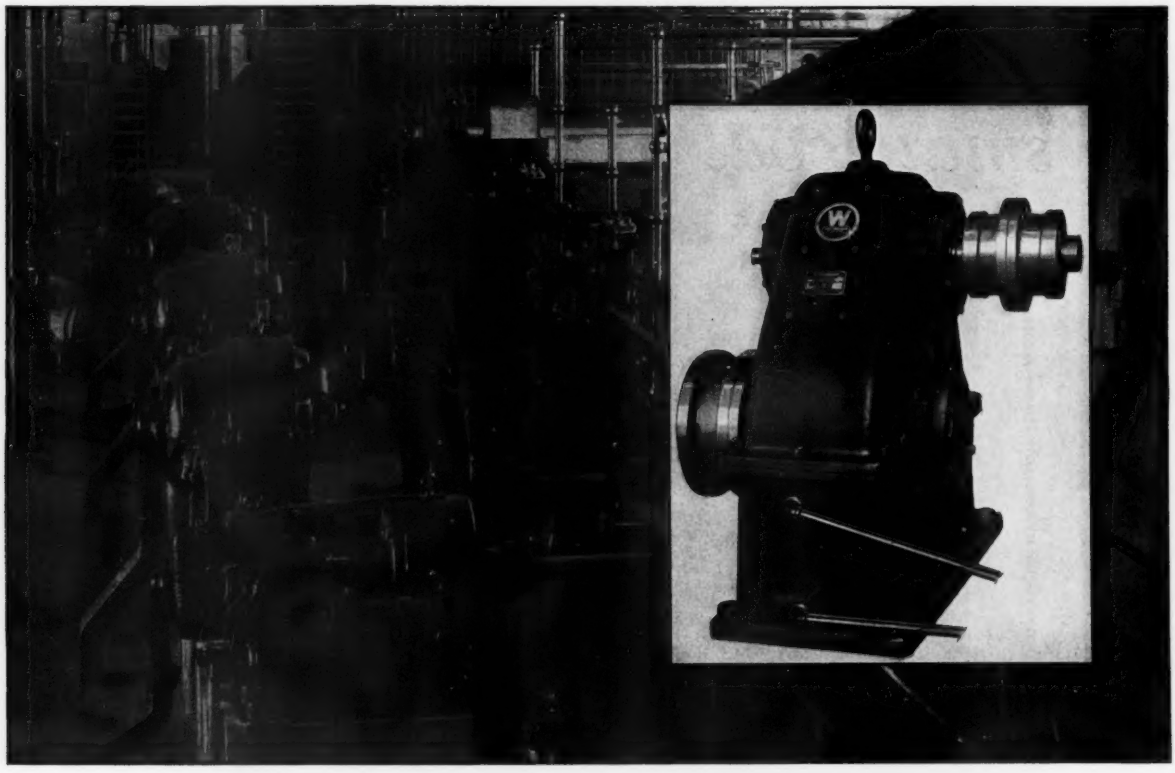
A second installation to double the capacity of this plant is under construction.

HYDROTATOR COMPANY

(Aersand Division) 1741 Oliver Bldg., Pittsburgh, Pa.

The AERSAND COAL CLEANING PROCESS

A Dry Float-and-Sink Separation



These Timken Bearings Have Run 70 Times the Life of the Average Automobile

The pinion bearings in the 6 Westinghouse-Nuttall gear reduction units at the Washington Pulp and Paper Company have each rolled up the enormous total of over 2,338,000,000 revolutions, and a recent check-up shows that they are good for many millions more.

Loaded 100% of their Timken catalogue rating, they have averaged 6¼ days per week, 24 hours a day since they were installed in April, 1923.

The total distance traveled by each of these bearings is the equivalent of driving an automobile more than 3,500,000 miles, whereas the average automobile travels but 50,000 miles during its entire life.

A worthy tribute to Timken stamina! Don't you want this same enduring economy in your mine cars, quarry cars, electric locomotives, power shovels, conveyors, pumps and blowers? The Timken Roller Bearing Company, Canton, Ohio.

TIMKEN *Tapered Roller* BEARINGS

The
MINING CONGRESS JOURNAL

**A Monthly Magazine—The Spokesman For The Mining Industry—
Published By The American Mining Congress**

VOLUME 17 JANUARY, 1931 No. 1

Editorials

Nineteen Thirty-One

WE WISH FOR OUR READERS AND OUR MEMBERS A YEAR OF PROSPERITY: A YEAR THAT WILL BE OUTSTANDING IN ITS RECORD OF COOPERATIVE EFFORT WITHIN THE GREAT MINING INDUSTRIES AND WE PLEDGE OUR BEST ABILITY IN ASSISTING MINING TO ATTAIN THOSE THINGS FOR WHICH IT IS SO EARNESTLY STRIVING: *SAFETY, EFFICIENCY, AND CONSERVATION*, TO BE ACHIEVED THROUGH COOPERATION.

The American Mining Congress
The Mining Congress Journal.

The Public Utilities Problem

AFTER giving due credit to many contributing influences it must be admitted that credit for the remarkable development of the United States must be given to that liberty of individual incentive which has led the way in the development of enormous business enterprises.

Henry Ford has revolutionized the transportation problem of the world. It is true that other causes must be credited with the creation of conditions under which the Ford flivver could be produced and used. It is true that other automobile manufacturers have contributed enormously to the easy transport from place to place, but Mr. Ford's efforts, more than any other one cause, are responsible for the present-day individual transportation facilities. These have contributed largely to advancing civilization, of education, to a greater mutual intercourse between peoples and largely to the breaking down of provincialism, all of which are essential to the highest cooperative efforts in civil advancement.

Prior to the automobile era the great railroad pioneers developed the systems which brought different communities in closer contact with each other, enabled our business to be nation-wide and changed our whole system of individual hand production to mass production based on the use of machinery.

Control of the railroads, because of being a public utility requiring a franchise, has always been made a matter of political agitation, and the only communities which have ever been disposed to be completely fair to public utilities are those communities which are without railroad service and recognize that no community can reach its highest success without the benefit of easy transportation facilities. The railroads have always been the football of politics and, with but few exceptions, the great railroad builders have been traduced and abused and forced into politics in order to defend themselves against political demands sometimes just but mostly unjust.

From the little power line at Telluride, Colo., which demonstrated that electricity for power could be transmitted by wire has grown the enormous network of public service, which has been of inestimable benefit to every community which it has served. When these units were of local service, the political issues were of a local nature. When the Government, through its superpower commission, advocated interconnection between power-developing centers in order that waste hydropower in one community might be transmitted to another which, because of lack of rainfall, could not meet local requirements, this was a holy issue and demanded only commendation. But when private capital undertook to render a similar service on a purely commercial basis we find the political opposition enhanced to a dangerous point.

The New York Times, in an editorial in its issue of November 7, calls attention to the political successes of many critics of the so-called "power trust" and gives expression to what we believe to be a very unsound conclusion. We quote: "One would have to search with a microscope to find a successful candidate for high office who defended the utilities or even had a kind word to say for the regulatory process." From this conclusion it is assumed that the result of the recent election was based upon a belief that the Government should enter the business of producing and distributing power.

It may be true that this was one of the influences leading up to the general result, but as a matter of fact it was but one of many and not a principal issue. The election of Governor Roosevelt in New York by a ma-

jority of three-quarters of a million by an examination of the returns shows that Mr. Roosevelt, who was an advocate of state power control, received 370,000 less votes than in 1928, and that the Republican stay-at-homes exceeded a million. It is difficult in these returns to find a record of public approval for the government operation of public utilities.

The hazards of water-power development are entirely overlooked by the agitators. The value to public development of cheap and convenient power are underestimated. The writer recalls a time when the Colorado Power Company had expended twenty-two million dollars in an enterprise based upon water appropriations made by various individuals, which were so consolidated as to form the basis of a large enterprise. After this had been accomplished and investments made to the extent of approximately twenty-two million dollars, public agitators, who believe that every successful enterprise must be based on unfair practices, undertook, through the United States Government, to destroy this enterprise by cancellation of the original water appropriations and thus make worthless the total investment. Fortunately the courts were available to prevent the entire destruction of this investment.

At another period the Government constructed the Alaskan Railway paralleling the lines of the Tanana Valley Railway, built and largely owned by the late greatly beloved Falcon Joslin, and forced him either to lose his whole investment or to turn over his railway line at less than one-third of the cost of construction.

At this time Muscle Shoals proposals for Government operation and distribution of electrical power carry with it the practical confiscation of something like four million dollars worth of distribution lines built to serve and now serving very great public need at prices controlled by state public utility commissions. The stampeding of the voters of the country by political clamor will not justify the effort toward public operation of utilities, the services of which are regulated by the public utility commissions controlled by the people.

A Tariff Wall For China

THE latest move in the direction of tariff protection is the effort of China to establish a tariff not for the purpose of protecting the extremely low wage scale of its people but for the purpose of raising revenue. The United States is the one country of all the world which requires a protective tariff in order to maintain its standards of living. With the wealth accumulated under the tariff system our Government is able to raise by direct taxation whatever sums are necessary to carry on its affairs.

The Chinese tariff will apply particularly to the imports from the United States, and yet it is our belief that through a more stable government made possible by its income under the proposed tariff the market for American exports in that coutnry will be so increased as to redound to our great benefit. Much has been said in recent times about retaliatory tariffs. Any country would be next to insane which undertook to create a tariff for any other purpose than the building up of its own industries through its direct protection or indirectly through the protection afforded by a better supported government. The effect of the proposed Chinese tariff upon world trade will be watched with interest.

The Function of Government

IN THESE days of multiplying appeals for aid to the Federal Government it would be well to analyze the purpose of government and the extent to which it is justified in considering any of the various demands for either direct or indirect contributions of any character.

The first purpose of government is to maintain law and order. To enact basic rules is the work of the legislative bodies, and to enforce those rules is the function of the courts. The rights of each individual citizen can only be safe where speedy punishment can be administered to each violator of individual rights.

Calvin Coolidge points out in a recent article that the welfare of a great mass of our people depends "not only on their own efforts and skill but on the ability and success of some large concern and only if the concern prospers are they secure. That is why the Government encourages industry. It is difficult to assist the wage earner directly but he can be benefited by making it profitable to employ him." It is the business of government, then, to create and defend conditions under which each individual may have opportunity to offer for sale in a stable market whatever he may have to sell. It may be his labor, it may be the goods which his labor produces. His independence is only certain under conditions in which there is a market for that which he has to sell. Whether he is able to sell or not depends upon his own ability, his efficiency and skill in production; in fact, upon the individual himself, who must meet the competition of others striving to reach the same market. It may be heartless to say that in times of dire distress occasioned by flood, drought, or by any cause not the fault of the individual, that the Government should not with its power to take from the rich, its taxing power, that it should not exercise this power for the benefit of those who are suffering.

Nevertheless it is true that this is not the function of government and if the Government is to exercise these unwarranted functions then the great philanthropic movements, particularly typified by the Red Cross, have no place in our public life. If government is to be a great Santa Claus, if it is to take from the rich and give to the poor, then that appeal to the kindler sentiments of the human heart will lose its force and the greatest privilege which can be afforded to the successful, the opportunity to aid his fellows, loses its appeal. Why appeal to the better sentiments of humanity, to the generosity of our people, when the Government has the right to take from those lacking in generosity by forcing whatever fund is needed to give temporary aid to the unfortunate. If these expressions are well founded, then our Government might well hesitate to yield to the many pleas for aid to the drought and flood-stricken communities. It will be well for our Government, which means all of the people, if its effort shall be confined strictly to the limitations of our Federal Constitution.

Why Gloomy

IN WASHINGTON our merchants report a very greatly decreased business and, generally speaking, there is a belief in business depression very discouraging to those who do not analyze the situation. Washington is a city in which there can be no hard times except that created by a despondent psychology. Washington lives off the Government. It has 90,000 people upon the Government pay roll who receive their salaries promptly, regularly and in gradually increasing amounts. These increases perhaps may be small, but they are increases nevertheless. Four great buildings

are under course of construction, one, the Department of Commerce building, being the largest of its kind in the world, with 47 acres of floor space. These disbursements are in addition to the usual money flow which supports the city. In addition, there have been large disbursements for land purchased by the Government to carry out its enlarged building program. Washington should be in a more prosperous condition than it has been ever before, and yet on every side we hear complaints of business depression as affecting our local affairs. There is no excuse for such talk in the city of Washington. Except in those sections where drought or floods have created unusual conditions there is no excuse for pessimism anywhere in this country. There is a reason for the winding up of unsound banking organizations and the more unsound stock and bond selling corporations whose existence has been a parasite upon unusually prosperous business conditions. No one can dispute that there has been a vast recession from the boom days of 1929, nor will any thinking man doubt that that recession was an essential to stable business conditions, and that, having got by it, the country will be in a sounder and more prosperous condition than ever before.

Stabilization

AN OUTSTANDING development in the efforts looking to stabilization of production to meet market demands, the conservation of resources and labor, and a uniform earning power is Resolution No. 322, introduced in the House of Representatives by Judge Geo. S. Graham, chairman of the Judiciary Committee of the House of Representatives.

This resolution authorizes the Judiciary Committee of the House to conduct an inquiry into the power of the Congress of the United States to establish an administrative tribunal, with authority to render advisory opinions as to whether or not submitted commercial contracts or agreements affecting interstate commerce are or are not violative of the Anti-Trust Act and to submit such recommendations for legislation as it may deem necessary. The Sherman Anti-Trust Law has been the subject of intense discussion by the industrial world since the day of its enactment. Questions arising thereunder have been continuously before the courts of the United States, and perhaps no one subject has occupied more time of the Federal courts.

Volumes of testimony have been taken. Fees paid to attorneys in trust litigation aggregate more than the cost of the Civil War. Business has been under continual surveillance and growing business has been under continual suspicion. The issue has been productive of more agitation than any other one subject. More blatant reformers have climbed into office on the back of promises to annihilate the trusts than upon any other one issue.

Gradually the Supreme Court recognized some virtue in those captains who developed large lines of industry providing employment of thousands of men at high wages. This beneficent result might have some merit even though that business success engendered a suspicion in small minds that this growth and prosperity might be based on a monopoly. In the competitive business world, whose leaders were men of integrity and whose success was largely based upon the confidence which their business probity had developed, there seemed to be a justification for big business. But these results fed rather than satisfied the suspicious that all big business must necessarily be venal. A few only of the most flagrant cases could be prosecuted by the Department of Justice and, with but a few exceptions, most of this litigation has failed its purpose.

In the business world there is a substantial belief that the substantive law with relation to trusts has served a useful purpose, but there is a strong desire that acts believed to be entirely in conformity with that substantive law should be able to find justification without indictment, prosecution, and a final decision of the Supreme Court.

The resolution above referred to seeks, through public hearings, to decide whether or not some authority should be created which can give to the business interests of the country an advisory opinion as to the legality of proposed business cooperation which is in itself beneficial to the public interest.

Under Consumption

PERHAPS no one expression bears more of the public criticism during the current business depression than the word "overproduction." More shoes have been made than the markets can consume. Factories must close until the markets use up the surplus. Closed factories mean idle hands. The closed factory, upon the one hand, lessens the demand for hides and leather, which, in turn, puts an additional burden upon the cattle industry. The dairy industry, closely associated with cattle, must suffer. Upon the other hand, men out of work are unable to consume the products of other industries, and, again, the retarding effect of business depression exerts itself and in these other lines of industry overproduction results.

Is it not time that a better understanding of the relation between production and consumption shall be developed in the public mind. So long as people exist who lack shoes, who lack food, and who need clothing, there is no overproduction in those lines. No matter how high the surpluses may be piled up. The fact is that it is not overproduction but underconsumption which is the real difficulty.

In some parts of the world starvation prevails through which almost millions of lives are sacrificed annually. Is there an overproduction of wheat when people are starving? The lack of distribution of these products to those who need them is more to blame for depressed business conditions than the fact that we have a surplus. All kinds of remedies are proposed in this wonderfully prosperous country, and we say a prosperous country notwithstanding the present business depression. There is a surplus of supplies which the consumer is unable to purchase no matter how great his need.

The five-day week is offered as a remedy. In other words, if we are producing too much, let us stop this production by cutting off the supply of labor. Others advocate hand work instead of the use of machinery in order that there may be enough jobs for all. Without machinery, there would not be enough of the necessities, to say nothing of the luxuries of life.

We are forced to decide between more leisure or more things. If all were idle, there would be none of the necessities or luxuries available. If all were employed, additional luxuries will be available as well as a complete supply of necessities. No rule can be laid down which can make steady, uniform, and complete the production, distribution, and exchange of commodities. Notwithstanding the present business depression, and in face of it, we insist that the Government of the United States under the Constitution makes possible a nearer approach to conditions in which every man willing to

work may secure all of the necessities of life and some of its luxuries.

More things, and not more leisure, will, in the end, bring most of happiness.

A World Silver Conference

THE December issue of *Mining and Metallurgy* publishes an article by Harrington Emerson, of New York, who recommends the complete replacement of the silver dollar and the issuance of circulating silver certificates made receivable by the Government for all taxes and imposts, the value of such certificates to be based on silver bullion at 31 cents per ounce. Mr. Emerson recommends this plan as a palliative which, in his opinion, would—

"(a) Stimulate industrial production.

"(b) Raise the price of wheat and other alternate farm products.

"(c) Increase our exports to foreign countries.

"(d) Add $4,000,000,000 to the existing wealth of the United States."

Mr. Emerson says:

> "The value of the currency depends on the ability of the Government to make good. The United States can make any piece of paper it chooses to stamp equal to gold if it can absorb all the issue in taxes. And the United States collects $4,000,000,000 annually in taxes. The present silver certificates issued against the deposit of silver dollars (worth 27 cents) are not legal tender, but they are receivable for taxes, stand at par with gold, which is legal tender and has intrinsic value. The silver dollars are legal tender, have a shameful intrinsic value and are not convertible into anything else, yet circulate at par like the certificates because they are receivable for taxes."

Mr. Emerson apparently believes that the United States is strong enough financially to fix a permanent value upon the silver of the world and to protect that value without aid from other countries. He states: "Neither total volume in existence nor relative annual production has anything to do with the ratio of value between the two metals."

By his plan Mr. Emerson undertakes to create as an alternate for the gold dollar a silver certificate based on 1,500 grains of silver, which would give his certificate a gold value so long as silver is 31.5 cents per ounce. The amount of silver supporting the certificate constituting an alternate dollar is to gradually decrease at the rate of 6 percent annually from the 1,500 grains at present recommended to 232.2 grains.

Mr. Emerson's plan provides that:

> "Holders of silver bullion may deposit it with any subtreasury, at the price quoted 30 calendar days previous, and receive in exchange silver certificates, expressed in dollars, which would be receivable for taxes and all payments due the Government at face value, and would be legal tender for debts when so stipulated and contracted."

Mr. Emerson proceeds to say:

> "Under such a law, reestablishing the needed alternate, not one ounce of silver would be deposited with the United States Treasury. No silver certificates would be issued, there would be no inflation of the currency; and if at any time in the future it should be desirable to meet the growth of population by a larger metallic reserve to keep up the circulation per capita, it could immediately be effected by altering the rate at which the silver bullion would be received."

Mr. Emerson concludes this interesting article as follows:

> "Not only would this measure immediately help unemployment, it would also help the transition to the new era. The permanent decline in employment of labor is a greater danger than the temporary slump we are trying to meet now. It is brought about by the so-called mechanization of industry, the displacement of manual energy by mechanical power.
>
> "While the world is studying the trend that is steadily, relentlessly and inexorably undermining employment, while it is searching for a lasting remedy, the adoption by the United States of a silver policy of its own, making silver an alternate money metal, would do much to help the year 1931 to recover its balance."

It seems apparent that there is not enough gold in the world to meet its requirements for money. As the world's commerce and industry is expanded, as more of the world's gold is being absorbed in the arts and for manufacturing purposes, and as the world's production of gold is decreasing, serious problems are being developed, the solution of which require the best thought of bankers and economists.

In discussing the causes of the present world-wide business depression there are two outstanding causes which have not been given major consideration. First, the relentless contraction of world gold supply as compared with increasing world wealth; second, the ruinous decline of silver prices.

These are problems of concern to all nations—All nations should join in effecting remedies—The United States should lead—It should waste no time in assuming leadership—It should without delay arrange for a world conference on Gold and Silver.

Legislation vs. Payrolls

NINETEEN hundred and thirty-one will see the legislatures of forty-four states in regular session. It is a safe assertion that forty-four sets of tax laws will be formulated. Forty-four separate attacks will be made on general business in the great game of "Raise the Money."

It is recognized that, while the state has no source of revenue except taxation, no economic law operates more ruthlessly than the "Law of Diminishing Returns," and no one factor serves to stagnate Industrial Development so effectually as misdirected and unscientific taxation.

Concerted effort in the development of natural resources will create the necessary values as a basis for sound taxation, while avoidance of legislative interference with industry will promote harmonious relations between men of capital and holders of natural resources.

Industrial counties invariably carry the burden. To continue assessing higher and higher levies on existing industries is to penalize thrift and drive capital elsewhere. To survey and analyze the flow of goods in and out of a state, and then to scientifically predicate necessary development, is a practical method of increasing assessable values and of securing additional pay rolls, which latter, in turn, supply industry with working capital, and result in prosperous stores, improved markets for farm produce, and avoid the imposition of burdensome and destructive tax measures.

As Confucius once said: "Good government obtains when those who are near are made happy, and those who are far off are attracted."

Iron Ore Industry in 1930

DUE to the fact that much of the iron ore mining is controlled by the steel industry recent mergers in this industry have further tended to control and conserve this, the most important of our nation's raw materials.

This year the Lake shipments were completed the last week in November and the all-rail shipments will not be completed until approximately the time of publication of this article. However, it has been possible to get fairly accurate estimates, and with these and the Lake shipments separated by ranges, Table I has been prepared.

In this table the same data for 1929 is included for the sake of ready comparison. It will be observed that the total for the current year is approximately 71.5 percent of 1929. The production of all of the ranges are near this percentage, except the Vermilion, which this year increased its production slightly over 1929. The result of this maintenance and a slight increase over last year's production, is to increase the percentage of the Vermilion range from 2.8 to 4 percent of the total Lake Superior production.

A further analysis of the Lake shipments is to be found in Table II, which contains tonnage figures and percentages of total by ports and docks for the two years, and also for the month of November.

In making comparisons to indicate our present business depression, the mistake is frequently made of comparing only to the banner year, 1929. The decrease of iron ore production referred to above of approximately 28 percent from last year, is actually less than 12 percent decrease from 1927 and 1928, which may be fairly taken as normal years. During those years, as will be seen in Table III, which gives a comparison of the last 10 shipping seasons, production was 51 and 54 million tons respectively. The decrease for the month of November was 49.57 percent as compared with the same month last year.

The automobile industry leads the field in the consumption of steel by slightly in excess of 18 percent of the total. Building and other construction comes second, and railroads which formerly held first position year after year, are now relegated to third place. Uncertainty during this year in these industries has had much to do with the restricted production of steel and consequent restricted production of iron ore. While it is not entirely safe to predict, it nevertheless is reasonable to assume that present programs going forward in each of these three branches of industry which anticipate resumption of brisk business in 1931 will reflect themselves in the iron-ore producing situation. If this is true, next year should witness a return to normalcy. By this is meant a return to something like the ever ascending curve of iron ore production since 1885. A projection of this average curve to 1931 would indicate a production of approximately 60,000,000 tons; which is roughly 5,500,000 less than the production for 1929 and 6,000,000 more than 1928.

TABLE I

Range	Lake	All Rail (Est.)	Total
1930:			
Mesaba	30,894,524	303,586	31,198,110
Cuyuna	1,728,192	30,764	1,758,956
Vermilion	1,840,409	44,175	1,884,584
Gogebic	5,061,374	.....	5,061,374
Marquette	3,479,687	221,475	3,701,162
Menominee	3,578,796	.....	3,578,796
Total, U. S. mines	46,582,982	600,000	47,182,982
Canadian mines	.....	.....	.....
1929:			
Mesaba	42,437,963	570,276	43,008,239
Gogebic	7,620,062	4,023	7,624,085
Menominee	5,643,451	1,944	5,645,395
Marquette	5,153,042	256,670	5,409,712
Cuyuna	2,553,129	43,057	2,596,186
Vermilion	1,787,948	85,794	1,873,742
Mayville	.....	.....	.....
Total, U. S. mines	65,195,595	961,764*	66,157,359
Canadian mines	.....	.....	.....

* Includes 2,726 tons lost in transit.

TABLE II—COMPARATIVE STATEMENT—ORE SHIPMENTS FROM UPPER LAKE PORTS MONTH OF NOVEMBER AND TO CLOSE OF SEASON 1929 AND 1930

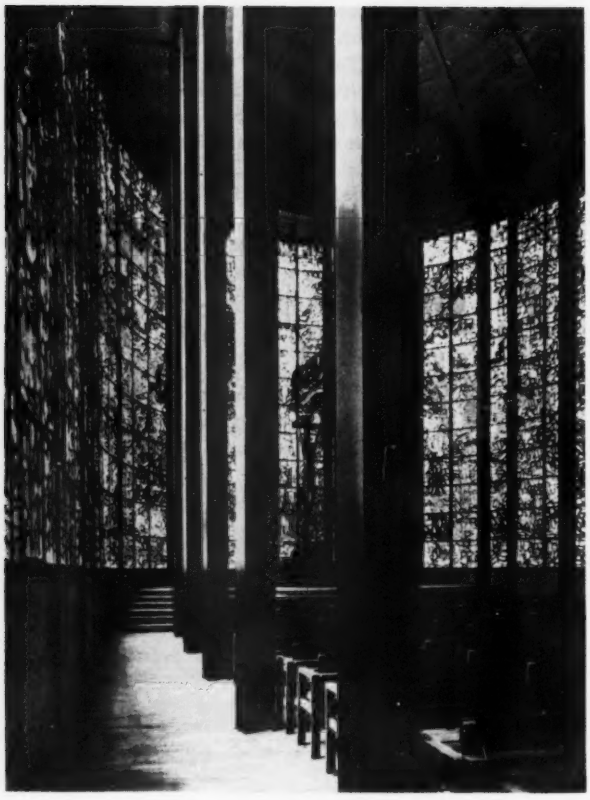
Port & Dock	November 1929	Percentage of total	November 1930	Percentage of total
Escanaba, C. & N. W.	365,925	9.29	146,860	7.39
Escanaba, C. M. & St. P.	208,595	5.29	46,669	2.35
Marquette, D. S. S. & A.	82,725	2.10	18,983	.95
Marquette, L. S. & I.	266,162	6.75	174,777	8.79
Ashland, C. & N. W.	332,611	8.44	125,372	6.31
Ashland, Soo Line	89,470	2.27	59,644	3.00
Superior, Great Northern	975,378	24.75	470,666	23.68
Superior, Soo Line	93,082	2.36	58,640	2.95
Superior, Northern Pacific	78,195	1.98	60,886	3.06
Duluth, D. M. & N.	1,096,560	27.82	587,640	29.57
Two Harbors, D. & I. R.	352,821	8.95	237,551	11.95
Total	3,941,524	100.00	1,987,688	100.00
1930 Decrease	.....	.....	1,953,836	49.57

Port & Dock	Season 1929	Percentage of total	Season 1930	Percentage of total
Escanaba, C. & N. W.	4,445,775	6.82	2,923,131	6.28
Escanaba, C. M. & St. P.	1,902,798	2.92	1,173,682	2.52
Marquette, D. S. S. & A.	875,843	1.34	550,684	1.18
Marquette, L. S. & I.	3,572,545*	5.48	2,410,986	5.17
Ashland, C. & N. W.	5,358,139	8.22	3,660,562	7.86
Ashland, Soo Line	2,261,921	3.47	1,400,812	3.01
Superior, Great Northern	17,355,736	26.62	12,450,361	26.73
Superior, Soo Line	1,373,871	2.10	1,013,623	2.17
Superior, Northern Pacific	893,532	1.37	689,569	1.48
Duluth, D. M. & N.	20,562,705	31.54	14,001,327	30.06
Two Harbors, D. & I. R.	6,601,735	10.12	6,308,245	13.54
Total	65,204,600	100.00	46,582,982	100.00
1930 Decrease	.....	.....	18,621,618	28.56

* Includes December Shipments—9,112 tons.

TABLE III—COMPARISON OF THE LAST 10 SHIPPING SEASONS

Season	1921	22,300,726	Season	1926	58,537,855
	1922	42,613,229		1927	51,107,136
	1923	59,036,705		1928	53,980,874
	1924	42,623,572		1929	65,204,600
	1925	54,081,298		1930	46,582,982



PART of interior of "Die Stahl Kirche," Cologne. This building is enclosed with copper and glass.

PROSPECTS for the COPPER INDUSTRY

By William A. Willis*

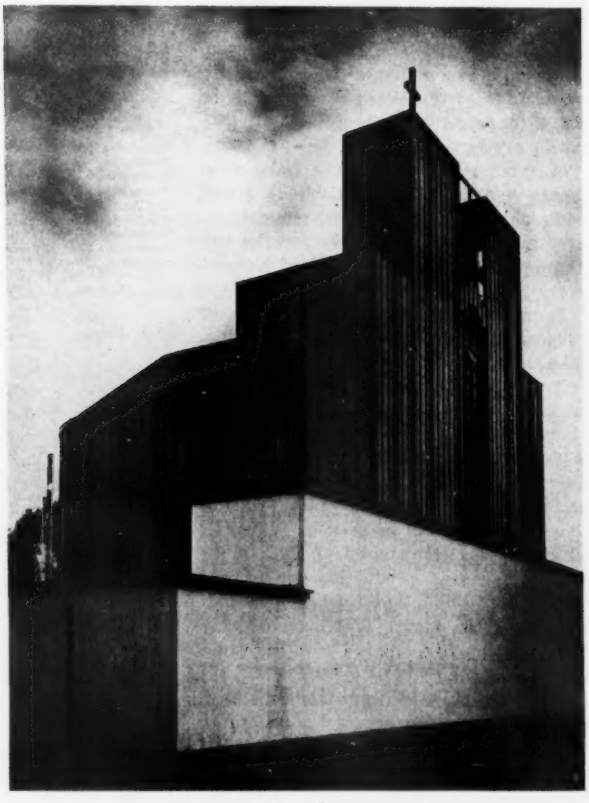
NOT so many years ago the art world was a bit startled and considerably amused by the work of a few painters who sought to interpret life in terms of cubes, angles and other geometric figures.

It might seem far-fetched or irrelevant to link potential markets for copper or for any other commodity with those queer futuristic canvases. But attributing to them a role as business builders is not as fantastic as at first thought it might appear.

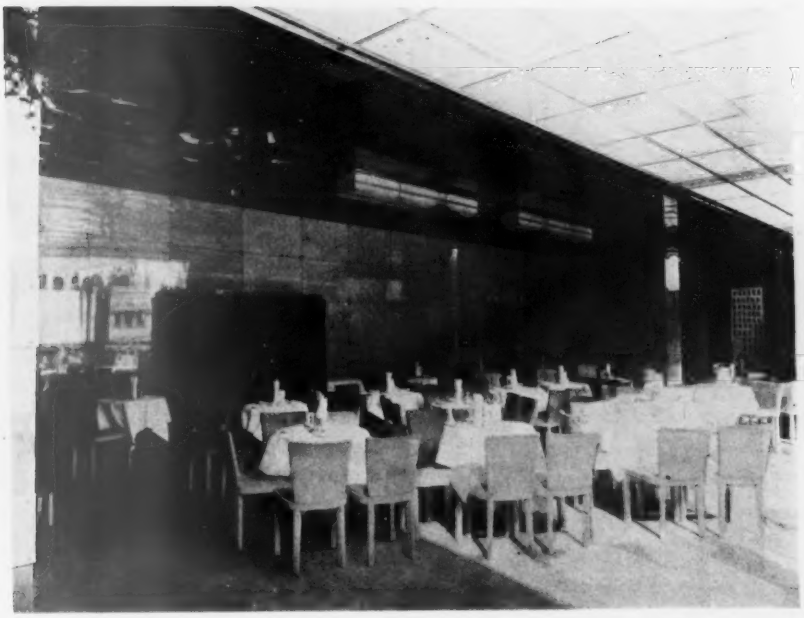
True, the cubist did not dethrone the classic in art. But he started something. His block and triangle conceptions gave the world a laugh, but the joke, if there was one, was not altogether on the futurist. His art may have been a trifle distorted but his vision was no jest. He was seeing ahead of his time.

For proof, take a look at today's trends in design. We don't call it cubist, nor is it that. We term it modernistic and no one thinks of laughing. The world found, after all, that something new, useful and desirable could be evolved from cubism. And the world has gone very much "modern."

* Manager, Copper & Brass Research Association.



VIEW of "Die Stahl Kirche," Cologne, showing tall copper covered towers



A corner in one of the dining rooms in the "Cafe Berlin," Gurmenia Haus, Berlin, showing polished copper ceiling. In other parts of the building both the walls and ceiling are of copper.

We see modernism reflected, today, in everything from pocket lighters to super ships. The latter reference brings us to construction, and construction whether it be ships, statues or skyscrapers, has considerable interest for the copper industry.

Lest it be assumed that modernism in shipbuilding is not especially significant from the standpoint of increased copper consumption, let me refer to some of the details of construction embodied in the *Bremen*, Germany's winner of blue ribbon honors on the North Atlantic. Apart from a tremendous use of copper and its alloys in conventional installations, the *Bremen* is distinctive by the employment of copper, brass and bronze for decorative effect.

These rustproof metals are points of high-light and relief harmonizing with the modernistic note which is conspicuous in the decorative treatment of the ship's passenger quarters. Modernism in all kinds of construction, today, is distinguished by a large use of metal and glass. You find this in the *Bremen*.

For example, the grand staircase is guarded by balustrades with banister work of brass in combination with glass. This is characteristic of important balustrades in all parts of the ship. Brass-enclosed wood paneling, brass-bound tables and table lamps, brass window mouldings, brass cornices for immense indirect lighting fixtures in the main public rooms and brass or bronze bas-reliefs on walls are but a few of the uses to which these shining metals have been decoratively applied. The ship's interior is, in fact, a symphony in wood, glass, copper and its alloys. A very large additional poundage of copper is accounted for by this modernism in ship adornment.

Modernism in architecture ashore trends toward large areas of metal and glass which mean speedier construction and a great saving of weight. Germany is a leader in modernistic construction and has many buildings which display a very extensive use of copper for vertical surfaces. Copper naturally is a preferred metal for this type of construction because of its lasting and rust-proof qualities.

Germany now has all-metal houses built in sections at the factory, shipped "knock-down" and requiring little labor in having them set up. The exterior of these houses, which are of the bungalow type, is copper.

Many new business buildings in the modernistic manner, employing much copper and alloys for exterior framing, have been or are being erected in German cities. Architects have even designed department store buildings in which masonry would not figure, the walls being simply "curtains" of metal and glass.

"Gurmenia Haus" is a famous new modern building in Berlin which houses a group of fine restaurants. Its exterior is largely copper, bronze and glass which make this structure a brilliant center in the sunlight and a white-light district all by itself when lighted by hundreds of electric lamps at night.

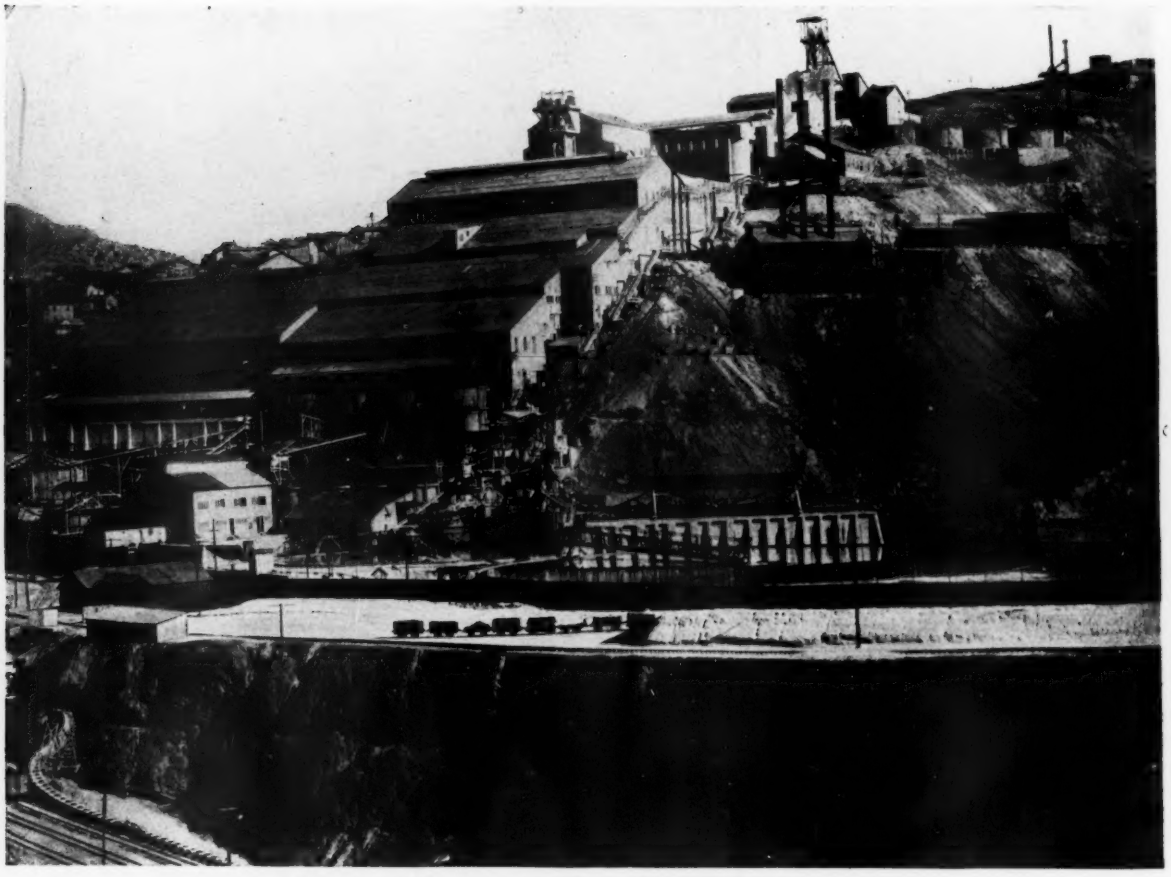
The walls and ceilings of the dining rooms are of polished copper, with narrow glass panels, which mirror the scenes at the tables.

Germany also has notable churches which show large use of copper for side wall construction. "Die Stahl Kirche," at Cologne, is entirely enclosed by copper and glass. Its tall towers display one of the most extensive uses yet made of copper on vertical surfaces.

All of this has great significance to the copper industry. American architects are much interested in modernism as applied to building construction and the success achieved elsewhere will no doubt, in time, be responsible for a much larger use of metal, particularly copper, for exterior walls or parts of walls in this country.

In this connection, it is worthy of note that many of the designs for buildings to house the Chicago world's fair in 1933 display a proposed extensive use of metal and glass for exterior construction. The fact that these designs are the work of the leading American architects is decidedly interesting as evidence of their receptiveness to new trends in structural details.

Many architects, here, are not hesitating to express the belief that, because of the general use of steel framework for buildings, the wall of the future will be merely a "curtain." When that belief is translated into actual construction it is almost a foregone conclusion that copper will be even more indispensable in building construction than it is today.



The Morenci Concentrator of the Phelps Dodge Corporation

ARIZONA Mining Industry in 1930

By Charles F. Willis*

A DISCUSSION of mining in Arizona in 1930 necessarily becomes a discussion of the world copper situation during the same year, as Arizona is largely dependent upon the one metal and is the largest producing section in the world. In order to place the importance of the State of Arizona as a copper-producing section, a few figures will not be amiss.

In the past 130 years, in which records have been kept with reasonable accuracy on the world copper production, there has been produced a total of about 36,000,000 tons of copper. Over 8,000,000 tons of this have come from the State of Arizona during the past 45 years. In other words, 22 percent of the total world production of copper in 130 years has come out of a single state in 45 years.

With the exception of one year, Arizona has been the leading copper producing state since 1907. For the period from 1845 to 1900, Arizona produced 14 percent of the copper of the United States; from 1901 to 1925, 34 percent; and in 1929, 41 percent. During the entire period of 1845 to 1929, Arizona has produced approximately 32 percent of all of the copper mined in the United States.

During 1929 Arizona contributed 414,500 tons of the 1,026,000 tons produced in the United States, and of the 2,104,000 tons from the whole world, and this was a record-breaking year for copper production in all three units. Arizona produced 41 percent of the copper of the United States and 20 percent of the copper of the world.

While Arizona normally stands fourth among the states in the production of gold and fourth in the production of silver—and these metals are important in their addition to the total value of metals produced—they are largely by-products of the copper industry and stand in no particular position of importance as individual branches of mining.

The importance and predominance of Arizona as a copper-producing state also means its dependence for its prosperity upon the world conditions in the copper industry, for copper is a basic commodity and the changes in world consumption will directly reflect themselves upon the State of Arizona.

There is, furthermore, a very direct connection between the industrial conditions of European countries and the prosperity of Arizona, for Europe has furnished the market for excess copper production above domestic needs, which

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spells the difference between prosperity and depression.

550,000,000 Pounds in 1930

Copper production in Arizona during 1930 will total approximately 550,000,000 pounds as against a production in 1929 of 829,000,000 pounds—66 percent. There is a difference, however, between the first half of the year and the last half. While the year's figures will show a 66 percent production, the figures for the last half of the year would show approximately 56 percent of the 1929 peak.

In other words, the curtailment of copper production which has been made necessary by world depression and lessened consumption of that metal is in Arizona approximately 46 percent as against 37 percent curtailment for the United States as a whole, 36 percent for North and South America and 23 percent for the world. World copper conditions are such at the present time as to reflect more intensively upon Arizona than upon any other country or political subdivision thereof.

It is not necessary to go into any discussion at this time of world copper conditions or overproduction that has been taking place during the past year; the increase in Canadian and African production; the decrease in European and domestic consumption, etc., except to say that the Arizona mines have, during 1930, faced and met a problem of adjusting themselves to conditions which have been complicated by handicaps over which the mines have no control.

The mines of Arizona during 1930 have taken far more than their share of the burden of curtailment; have lowered wages in accordance with the sliding scale based upon the price of the metal; have lowered costs by the elimination of extravagances acquired during prosperous times; by plant improvements; metallurgical research; and by the mining of the higher grades of their ores, and the stopping of the mining of the grades which could not possibly pay a profit under the conditions and prices which have been existing.

Taken as a whole, Arizona copper mines during 1930 have been able to maintain their costs and production in a more reasonable relation to demand and prices than was supposed could have been done, but it has been a period of real sacrifices by those connected with the mining industry.

Arizona activities at the large mines during 1930 have been largely in line with adjusting themselves to the newer industrial conditions and the preparing of the way to meet the future competition that the state may retain its position of leadership.

Phelps Dodge Progress

Probably the most important progress made by any Arizona mine during the past year is that of the Phelps Dodge Corporation, owning mines at Bisbee, Morenci, Globe, Nacozari, Mexico, Tyrone, N. Mex., with a large number of subsidiary enterprises. The program of the expansion of Phelps Dodge Corporation started with the appointment of Louis S. Cates as president of that company, and announcements have been following each other in rapid succession.

Among them are included the acquisition of the Nichols Copper Company, with refineries at El Paso, in the East, and connections in Canada, giving them complete refining capacity; the purchase of the National Electric Company, giving them eight units having a fabricating capacity of over 200,000,000 pounds of copper annually, and thus providing for the complete handling of copper from the mine to the consumer.

Negotiations are in progress between the Phelps Dodge Corporation and the Calumet and Arizona Mining Company for a merger of their mines, which are directly adjoining at Bisbee, Ariz., and, while there is no definite news as to the progress or probable consummation of this merger at the time of this writing, it is felt that announcements are not far away, and that the merger of these two large and important copper properties will bring about economies which will greatly increase the importance of the Phelps Dodge Corporation in the copper world.

The past 12-month period has seen numerous changes at these properties in line with the promoting of greater efficiency of operation, among them being the complete change of the Sacramento Hill open-pit project to underground handling; the installing of a natural gas-pipe line from El Paso to the smelters at Douglas and Clifton; the preparation for mining on a large scale of the clay ore body, which contains approximately 245,000,000 tons of copper ore, averaging about 1 percent copper; the remodeling and rehabilitation of plants and mechanical units to improve efficiency; the completion of a $1,000,000 improvement program at the smelter at Douglas consisting principally of a remodeling of the bedding and crushing plants and the building of a new anode copper plant; the construction and operation of a pilot mill for experimental work upon the clay ore body at Morenci, and other things. The operation of the Phelps Dodge lead smelter was suspended in April of the past year pending more favorable market conditions.

Through the acquisition of the Nichols Copper Company, Phelps Dodge Corporation has been given a refining capacity of 500,000,000 lbs. annually, and, through the National Electric Products Corporation, a fabricating capacity of

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approximately 200,000,000 pounds annually. The present Phelps Dodge mines have a capacity of approximately 220,000,000 pounds of copper annually, which will be increased to about 425,000,000 pounds annually if the Calumet and Arizona-Phelps Dodge merger is successfully consummated.

$2,000,000 Improvement Program

The pending merger plans have not in any way stopped the progress of the Calumet and Arizona Mining Company during the past year, for that company, under the direction of Harry Clark, general manager, has been completing a program of construction and improvements costing over $2,000,000, including the electrification of all equipment and operating units at the Junction shaft at Lowell, Ariz., and the enlargement and remodeling at the company's smelter at Douglas, Ariz. The smelter program, on which $1,600,000 was spent, included the enlargement of the roaster plant, the installation of a new reverberatory plant, new boiler and converter plants, and additional power units.

The smelter improvements also included the installation of an anode plant, consisting of two 100-ton tilting type anode furnaces with one casting wheel. Four additional roasters were added to the 24 which were in use, and three new reverberatory furnaces were installed to take place of the four formerly used. The 10 low-pressure-type boilers at the waste-heating plant were replaced by seven high-pressure type, and the six Great Falls converters were replaced by three Pierce-Smith converters.

At the mine the new Campbell shaft was sunk to a depth of 2,500 ft. and equipped with a new Allis-Chalmers electric hoist. The electrification program at the mine consisted of the installation of a new electric hoist at the junction shaft, three 4,400 cu. ft. Sullivan angle compound compressors, and 3,750 k. v. a. turbine generator, with a complete remodeling of the power plant and auxiliary plants, bringing the equipment of the Calumet and Arizona Mining Company up to most modern standards. Calumet and Arizona production during the latter part of the year has been totaling about 7,500,000 pounds of copper monthly. This includes the production of the New Cornelia Branch.

Have Increased Capacity

At the New Cornelia mines of this same company, metallurgical research has brought about plant changes which have greatly improved their opportunities. In line with the policy of the large copper companies in concentrating

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production on their low cost work during low metal prices, M. Curley, manager of the New Cornelia mines, announced in June the stopping of production from their electrolytic plant and the concentration of all of their work from the newly remodeled flotation plant.

The ore available for leaching and for the electrolytic plant at that property was nearing an end and would not permit of profitable operation with low cost metal, whereas most excellent results were being obtained from the new flotation plant. Recent experimental work has indicated certain changes in the flotation plant which will, it is believed, make possible an enormous capacity from a plant originally designed to handle 5,000 tons daily.

The first remodeling of this plant provided for comparatively slight changes in the flow sheet and put up the plant capacity from 5,000 tons daily to 12,000 tons daily, with a peak of 15,000 tons. Recent experimental work indicates that there is a possibility, from this same plant, of increasing its capacity to 24,000 tons daily, with a peak of 27,000 tons. Thus New Cornelia is adjusting itself to the changed copper conditions.

Globe-Miami Operations

In the Globe-Miami district the Old Dominion Company, under the direction of I. Barkdoll, manager, completed a mill-remodeling project and started work upon modernizing some of the mine equipment. The program included the construction of a new 120-ft. steel head frame and a 1,500-ton hopper bottom storage bin, this work being done while still using the shaft on which the head frame was being constructed.

The Old Dominion improvement program of the past year included the starting of the cementing of the 2,600-ft. shaft and project, which will probably take several years to complete.

At the Miami Copper Company, under the direction of F. W. Maclennan, general manager, there has been no material change. The Miami Copper Company is working on an extremely low-grade ore, having a yield of less than 12 pounds of copper per ton of ore. They are working in a caving system which requires constant operation and supervision. They had completed all plant improvements during 1929 and during 1930 have been running at capacity.

The Inspiration Consolidated Copper Company, T. H. O'Brien, general manager, in line with the policy of 1930 of producing copper where it can be made the cheapest, have shut down their concentrating plant and devoted their attention to the expansion of operations in the leaching plant, which was completed during 1929. This company is working upon ore containing approximately 1.1 percent copper, thus requiring the greatest possible efficiency in operation.

In May, 1930, the operation of a new plant for the treating of primary slimes removed from leaching ores was started. Experimental work showed that more satisfactory results could be obtained by the leaching plant if the slimes could be removed and handled separately. Thus a new plant was erected to handle 600 tons of slimes daily. Inspiration has largely taken care of its curtailment by the use of the five-day week, as the operations of that company would not permit of horizontal cutting with the maintenance of reasonable costs.

There have been no material changes in operations at the properties of the Magma Copper Company at Superior, or the Nevada Consolidated Copper Company, Ray branch, at Ray. Both of these companies have been operating on a curtailed program, but had no material amount of construction work to do, nor is any planned for the near future. Magma completed a mill modernizing program in 1929, which has permitted of very satisfactory work being done in 1930 under low metal price conditions.

Production Cut at Jerome

In the Jerome district "The Big Hole" (United Verde Copper Company) has been working on a very much curtailed program, running but two furnaces at the smelter but continuing a full program of underground development; the construction of the new No. 7 shaft, and the work in the steam shovel pit. During the year Robert Tally was made president of this company and W. V. DeCamp general manager.

The construction program during 1930 totaled about $3,000,000 and included underground construction necessitated by the new No. 7 shaft, the addition of another unit to the concentrator, copper refining experiments at the smelter, and the erection of a large number of homes for employes at both Jerome and Clarkdale.

The United Verde Copper Company have undertaken complete diamond drill development of a prospectively large copper property located between Superior and Miami, known as the 64 copper group and the Cibola property. The property has been optioned and is to be thoroughly explored, and United Verde officials have announced themselves as ready to fully develop the property should the exploration show it be of sufficient merit.

At the United Verde extension the new 200-ton flotation mill was placed into regular operation in July. This mill was for the purpose of handling 100,000 tons of 4 percent copper ore which had been opened up while developing for direct smelting ore, and it is reported that additional milling ore has been developed since the mill started operation. The company has continued handling of its direct smelting ore on a basis of about 3,500,000 pounds monthly.

The United Verde extension have also expanded and have recently taken an option on the Vulture mine, an old-time gold producer, upon which recent work has shown large possibilities of coming back into substantial production.

Small Properties Down

There have been numerous Arizona activities during the past several years which have now been slowed down or stopped for the time being by the depressed business conditions. Work was suspended on the Belmont Copper Mining Company at Superior in April, on the Tonopah-Belmont mine at Palo Verde, Ariz., in March, at the Hammon Copper Company at Kirkland, Ariz., in July, at the Verde Central Mines, Inc., Jerome, Ariz., in September, and at the Sheldon Mining Company, Walker, Ariz., in May. Production stopped at the Shattuck-Denn Mining Corporation, Bisbee, Ariz., in October, but development has been actively continued.

All of these properties are potential producers of importance, which low metal prices or inability to completely finance under present business conditions, have necessitated temporary discontinuance, and all of them will undoubtedly be resumed immediately upon improved conditions.

While work has not entirely stopped at the property of the Bagdad Copper Company, Hillside, Ariz., it has been slowed down considerably. The 200-ton concentrator and experimental mill was completed and operated for a time. This company has reached a point in its development work, where it is apparently ready to go ahead on a large scale just as quickly as business conditions justify any expansion in copper production.

Gold Mines Being Sought

Gold and silver in Arizona are by-products of copper. It is interesting to note that in Arizona about 80 percent of the gold production comes from the copper mines and about 5 percent from lead ores and complex sulphides. Only 15 percent comes from dry silicious gold ores.

The gold production of Arizona comes largely from the United Verde, United Verde extension, Calumet and Arizona, New Cornelia, Magma and the Copper Queen branch of the Phelps Dodge Corporation. There is but one mine in Arizona that has been of recent producing importance for gold alone.

Arizona, however, has shared in the worldwide search for gold mines, and there has been during the past year much

activity in the seeking of new gold properties, more particularly in the Oatman, Harqua Hala and Payson sections. Many years ago Arizona figured largely as a gold producer, but the copper mines have so far overshadowed the gold possibilities that gold mining has been neglected, yet bids fair to come back in a larger way in the near future.

Gold mining in Arizona has been stimulated by the discoveries made at the Tom Reed Gold Mines Company, Oatman, Ariz., during the past year, when a strike of great importance was made at a property that had been considered worked out and had been operated under leases for a considerable period. New possibilities of the Oatman district were demonstrated, which has resulted in more active development of a large number of other properties in the same district and which bids fair to greatly increase the importance of Arizona as a gold producer.

Arizona Mines Handicapped

Under the present conditions of the inability of the world to consume all of the copper which can be produced, and with the potentialities of Canada and Africa as copper producers, Arizona is standing in a position of having a lot of problems of competition. Arizona mines are well able to compete with those of the rest of the world from the point of view of operating efficiency and applied intelligence, but it has some natural handicaps to overcome.

Arizona ores, for instance, contain an average of approximately 26 pounds of copper to the ton as against an average of the ores of Africa of 120 pounds of copper to the ton. Arizona mines, even with the present low wages, are paying miners $4.95 a day as against 20 cents a day paid to the African negro, a condition which, to make it equitable, requires the Arizona miner to be able to do the work of 40 negroes. Arizona copper costs for freight $12.50 per ton to lay down in New York, or $18.50 per ton laid down in Europe as against a $6 boat rate of African mines to either New York or Europe.

In other words, Arizona mines have a handicap of having to produce in a section of the United States where freight rates and standards of living are high. They are maintaining a state wanting the best of schools, concrete roads, parks, etc., and are attempting, in a state which is but 16 years old, to catch up in providing cultural progress and opportunities with Eastern States which are 156 years old.

There are no Arizona mine operators who are desirous of reducing American standards of living, or to provide less in state, county and city facilities for the people, yet it must be recognized that there is a market for copper which is less than the ability of the world to supply, hence there will be, for some time to come, a keen competition to sell the metal, and in open competition the market will go to the place which can provide the commodity at the lowest price.

While there is some division now among mine producers as to the advisability of a copper tariff to protect the standards of living of American workmen, it seems to be agreed that the United States is not always going to be in position to compete and that a copper tariff will eventually be necessary or wages must come down, freight rates be reduced, and lower grade ores left in the ground rather than in providing employment.

Arizona copper operators are handling their problem in so far as it is possible for them to handle it themselves. They have little or no influence on the question of restrictive legislation, taxes, and the world copper situation is such that it would be comparatively easy to kill the proverbial goose. "The power to tax is the power to destroy" is applying with undue force upon Arizona mines, as it is helping to make costs that may eventually prohibit profitable competition.

The turn in the copper situation has apparently come by an agreement among the copper producers of the world that the industry would be better off by a curtailment of large proportion. This curtailment is of relatively small importance in so far as any further restriction of the Arizona mines is concerned, as they have already cut production more than their share, and it will not be necessary to cut further to maintain the level recommended.

The year 1930 has been a period of readjustment for the Arizona copper mines, a period when the necessary steps have been taken to adjust for the copper conditions which are to be encountered in the future.

The copper industry was running along on an inflated basis, production far too high, costs higher than necessary, extravagances had been creeping in, and many other things have contributed to the record year of 1929 when production, consumption, costs, dividends, new construction, and nearly everything else broke all previous records.

Thus the Arizona copper mines are facing 1931 on a readjusted basis, fitted into the conditions as they now exist, cognizant of the problems that are still facing them, production scaled down to fit the world demands, costs maintained even though they are on but a 60 percent production schedule, and they are far better able to make a proper showing than could be done during the period of readjustment.

ARIZONA

TABULATION OF COPPER PRODUCTION IN ARIZONA SINCE 1895

Year	Mil. lbs.
1895	48.0
1896	72.9
1897	81.5
1898	111.2
1899	133.1
1900	118.3
1901	130.8
1902	119.9
1903	147.6
1904	191.6
1905	226.9
1906	262.6
1907	256.8
1908	289.5
1909	291.1
1910	297.2
1911	303.2
1912	359.3
1913	404.3
1914	382.4
1915	432.5
1916 (war year)	694.8
1917 (war year)	719.0
1918 (war year)	769.5
1919	531.8
1920	553.0
1921	155.2
1922	428.2
1923	618.9
1924	677.7
1925	713.3
1926	723.5
1927	682.1
1928	732.3
1929	829.2
1930 (estimated)	550.0

Total copper production, 1895 to 1930, inclusive, 16,221,400,000 pounds.

500 Level Surface Plant, United Verde Copper Company

Metal mining outlook for COLORADO

By C. Lorimer Colburn*

ANY prophecy of what the future has in store must be based on past experiences, plus new developments and the ability of those engaged in the industry to carry on in spite of conditions.

The mining industry of Colorado has suffered for the past decade from a combination of economic conditions that have disrupted the industry and shaken it to its core. The railroad situation, tariff, taxation, metal prices, complex ore problems and keen competition, have been difficult problems to meet. The fact that the rich deposits near the surface have been largely exhausted, thus making it necesary for the deeper-seated, leaner, ores to be relied upon, have intensified all the above problems.

The present world-wide depression has had its effect on Colorado. The collapse of silver is particularly felt in this state because silver is an important element in the ores of nearly all of the mining districts.

When other metals are low in value and commodities are at a low price, the production of gold is usually stimulated. In spite of ProfessorFisher's index showing a slump in commodity prices, there has been very little reduction in cost to the mining companies. That is because a large part of this cost is freight, which has not come down. Labor is also high. So the net cost to gold mining companies has not been reduced to any extent. Many economists believe that the standard value of gold was set too low. Regardless of such views the fact is that the majority of gold miners find that the value of their product (which is gold) is too low in comparison to the cost of obtaining it from the ground. Of course, if labor and supplies drop in price, that would be equal to an advance in the value of gold; but no one wants to see wages dropped; so there you are. The gold miner is up against a hard problem.

In spite of such economic conditions the production of gold has increased in 1930 over 1929. According to preliminary figures coming to this office from the mining companies of Colorado, there was a gold production of $4,500,000 for the year 1930, compared with $4,417,358 for the year 1929, and an average production of $4,293,056 for the five-year period 1925 to 1929, inclusive. The 1930 output came chiefly from the Cripple Creek and San Juan districts, although there was an appreciable increase in production in Park County.

The estimated production of silver shows a decrease for the year 1930. This is due to the closing of the silver mines at Creede and elsewhere. The production of silver for 1930 is estimated at 4,300,000 fine ounces, valued at $1,655,000, compared with 4,397,377 fine ounces, valued at $2,343,802 for 1929, and an average of 4,289,059 fine ounces, valued at $2,584,686 for the five-year period 1925 to 1929 inclusive. The year 1929 sustained a larger production of silver than for the average shown in the five-year period, but the price of silver was so low during the last year that the actual return on the amount mined shows a decided slump.

Colorado mining men were disappointed that Congress did not give more protection on lead when framing the new tariff. The complex lead ores of Colorado are difficult to handle. They are concentrated by the flotation process prior to smelting. The extra cost of handling such ores makes a higher price necessary. The decrease in the price of lead has closed mines that could yield a regular tonnage, and has curtailed the operations of some of the larger properties. The Sunnyside mine at Eureka was compelled to close down its flotation plant, and has confined its operations to development. This resulted in the closing of the Durango smelter, which robbed some of the smaller producers of a market, and resulted in their closing. The Leadville smelter of the A. S. & R. Company continues to run, and although this smelter is drawing ores and concentrates from various parts of the State, yet many of the mines can not profitably ship to Leadville. The production of lead, therefore, during 1930 shows a decrease, but this decrease is not as much as would be expected under the circumstances. The estimated production of lead in Colorado for 1930 is 46,000,000 pounds, valued at $2,390,000, compared with 48,889,906 pounds, valued at $3,080,064 produced in 1929, and an average of 60,223,597 pounds, valued at $4,277,380, for the five-year period 1925 to 1929 inclusive.

Zinc has been faced with nearly the same economic conditions as lead, with the exception that Congress granted a slight increase in the tariff on zinc. This slight increase is obtained under the provision that made the terms of the old tariff applicable to lower grades of ores and concentrates. This slight difference was a direct benefit to the producers of zinc in Colorado, and therefore the estimated production for 1930 shows an increase over 1929. The estimated production of zinc in Colorado for the year 1930 is 71,000,000 pounds, valued at $3,330,000, compared with 58,861,000 pounds, valued at $3,884,826 for 1929, and an average of 65,734,600 pounds, valued at $4,478,572 for the five-year period 1925 to 1929, inclusive. The value of this output shows a decrease on account of the lower price of zinc.

Copper in Colorado is a by-product. There are no copper mines, but copper is often found in small amounts associated with gold and other metals. The estimated production of copper for the year 1930 is 9,000,000 pounds, valued at $1,100,000, compared with 8,905,074 pounds, valued at $1,567,293, for the year 1929, and with an average of 5,786,930 pounds, valued at $871,900, for the five-year period 1925 to 1929, inclusive.

Colorado has developed a sizable industry in the production of rare metals, especially those used in the steel industry; namely, tungsten, molybdenum, vanadium, and manganese. On account of the slump in the steel industry there has also been a decrease in the production of these metals in Colorado. Congress granted an increase in the tariff on tungsten. Those companies that were producing tungsten steel prepared for this increase by laying in larger stocks of tungsten than usual. Then the demand for tungsten steel dropped, and at the present time these companies have not had the opportunity to consume their tungsten stocks. This has reacted unfavorably on the tungsten industry in Colorado, which is the main source of supply for tungsten in this country. Therefore the production of tungsten in Colorado for 1930 was low, and will show a marked decrease. The estimated production of tungsten concentrates in Colorado for the year 1930 is valued at $75,000, compared with $150,000 produced in 1929.

Molybdenum demand has held up to about 80 percent of the 1929 requirements. The estimated production of elemental molybdenum for the year 1930 is 3,100,000 pounds, valued at $2,790,000, as compared with 3,529,295 pounds, valued at $3,350,000, in 1929.

* Secretary of the Colorado Chapter of The American Mining Congress.

The production of vanadium for 1930 is estimated at 1,100,000 pounds of V_2O_5 valued at $1,375,000, compared with 1,204,000 pounds of V_2O_5 in 1929, valued at $1,505,000.

The production of manganese ores (all iron-manganese), although showing a falling off, has held up fairly well. All the Colorado manganese production is consumed by the C. F. & I. plant in Pueblo. This company has no large stocks ahead, and has been drawing on the Colorado producers according to its needs. The estimated production of manganese ore during 1930 is 20,000 tons, valued at $120,000.

SUMMARY

Estimated production of metals in Colorado for the year 1930:

Gold	$4,500,000
Silver, 4,300,000 fine oz.	1,655,000
Lead, 46,000,000 lbs.	2,390,000
Zinc, 71,000,000 lbs.	3,330,000
Copper, 9,000,000 lbs.	1,100,000
Tungsten	75,000
Molybdenum, 3,100,000 lbs.	2,790,000
Vanadium, 1,100,000 lbs. V_2O_5	1,375,000
Manganese	120,000
	$17,335,000

This shows the value of the metals production of 1930 to be $17,335,000, compared with $19,326,766 for 1929 (record of production as published by commissioner of mines).

This is a good record, considering the world-wide depression and the slump in the value of metals. The number of men employed in the industry has kept up almost to normal. The outlook for the future is good. Development and prospecting have kept going steadily on. Colorado will be called upon, more and more, to supply the needs of the country for the rarer metals, and there will be an increased production of the precious and base metals.

Portion of surface plant of Central Eureka Mine, Sutter Creek, Amador County, California. Forty-stamp mill shown on right

Metal Mining in California

By G. Chester Brown*

THE outlook for the metal industry of California for the year 1921 is promising as to gold and quicksilver production, but very poor as to copper.

Prospecting for gold has increased recently, and should sufficient capital be available the number of producers should be materially increased. Conditions in the deep mines are favorable as the ore shoots are as good as those found nearer the surface. However, the excessive cost of workmen's compensation, taxes, etc., greatly handicap those engaged in the mining industry.

It would be timely for Federal aid for gold producers, such as the elimination of the income tax. Surely Canada has set the example by offering proper inducements for the production of gold.

Due to the drop in the price of copper, the production of this metal in California will be small indeed. Such mines can not operate at a profit under the existing price, and the outlook for some time to come is not promising.

Quicksilver is in excellent condition and active prospecting is being pursued. It is predicted that California will continued to lead all states as a quicksilver producer for some years to come.

* Secretary, California Metal and Mineral Producers' Association.

Mining in UTAH in 1930

By A. G. Mackenzie*

UTAH shared with other nonferrous metal mining states in the general depression that attended the industry in 1930. Although most of the larger companies continued operations, the output was greatly diminished and forces were reduced about one-third as compared with 1929.

The extremely low price of silver, of which Utah is the leading producer among the states, was felt especially and brought the composite price of the state's leading metals to lower levels than in the depression of 1921-22.

Some of the companies maintained dividend payments, although at reduced rates, and paid in part from reserves. The Eureka Standard Mining Company, a new gold producer of the Tintic district, entered the dividend list in 1930.

Considerable development and construction work was done by old and new companies during the year, and these activities made it possible to employ more labor than would have been used had operations been restricted to production. The Utah Copper Company, which curtailed production heavily early in the year, adopted a part-time schedule which enabled the company to provide from 70 to 100 percent employment to a force only slightly reduced in number from that employed in 1929. This and other plans designed to meet the situation were employed as far as practicable by other companies in the state.

A state tax revision program adopted in November provides that the present method of valuation of metal mines for taxation shall remain as at present until January 1, 1935, and thereafter until another method is adopted by the legislature. It is expected that the action taken in November will be followed at the January, 1931, session of the legislature by efforts to impose state business and personal income taxes in Utah. The principal sponsors of the tax revision program were Gov. George H. Dern, the State Farm Bureau, and the Utah Education Association.

* Secretary, Utah Chapter, American Mining Congress.

Mineral Production in NEW MEXICO

By Joseph F. Woodbury

PROF. E. H. WELLS, president of the State Bureau of Mines and Mineral Resources, has prepared a circular entitled "An Outline of the Mineral Resources of New Mexico." The figures and facts herein used have been obtained from the paper prepared by President Wells.

The total value of the mineral production of New Mexico in 1929 is estimated at $37,722,000. The mineral production and the value of the same being classified as follows:

Clay and clay products	$240,000
Coal	8,314,000
Copper	17,900,000
Gold	707,000
Lead	1,397,000
Petroleum and its products	2,500,000
Sand and gravel	300,000
Silver	582,000
Zinc	4,522,000
Miscellaneous, including fluorspar, gems, gypsum, iron, lithium minerals, manganese, mica, mineral waters, molybdenum, salt, and stone	1,260,000
	$37,722,000

The above classification falls under three heads—metals, non-metallic minrals and hydrocarbons.

The most metal extensively mined in New Mexico is copper. In the year 1929 the copper production was about 100,000,000 pounds, valued at $17,900,000. Approximately 85 percent of the state's production for the year came from the Chino mines of the Nevada Consolidated Copper Company at Santa Rita, Grant County. The balance of the production came from Lordsburg District in Hidalgo County; Fierro, Grant County; Pastura, Guadalupe County; and Scholle, Torrance County. At Tyrone in Grant County a large, low-grade copper deposit occurs. This property has not been worked since 1921. While in the past copper has led in the value of mineral products produced in the state, it now looks as though the hydrocarbons will soon take the first place.

The Hobbs field in Lea County was discovered in 1928. This is a major oil field, and the potential production of this field on August 1, 1930, was approximately 415,000 barrels per day. With the extension of this field, as well as the other fields in New Mexico, we may soon expect to see New Mexico listed as one of the leading oil-producing states.

Zinc, lead, gold, silver and manganese added to the production of mineral wealth in New Mexico for the year 1929. The value of the zinc production is approximated at $4,522,000, the lead production at $1,397,000, gold at $707,000, silver at $582,000.

The non-metallics of New Mexico have been of much less commercial importance than either metals or the hydrocarbons and have not been exploited to any great extent.

The value of the coal produced in 1929 was approximately $8,000,000, and the principal production came from the Raton District in Colfax County and the Gallup District in McKinley County. The coal resources of New Mexico are enormous and have been estimated to be in the neighborhood of 192,000,000 tons.

The above figures are for the year 1929. During the year 1930 some curtailment was experienced and the value of New Mexico mineral production for the year 1930 will not equal that for 1929. However, in consideration of the general slowing up of business for the year 1930, the mining industry in New Mexico has not suffered as have some other industries, and we look forward to an ever-increasing production for the year 1931, which will equal or surpass that of the year 1929.

Review of the TRI-STATE DISTRICT

By M. D. Harbaugh*

IN the Tri-State zinc and lead mining district the following figures reveal a picture of 1930 operations as compared to those of 1929:

	Tons concentrates Produced		Weekly average no. mills operated	Tons concr. stocks on hand at end of year	
	Zinc	Lead		Zinc	Lead
1930	450,000	56,000	76	50,000	16,000
1929	634,000	91,000	114	45,000	3,500

While 1929 as a whole was, due to good prices, a comparatively good year for the mines, production was still much below the capacity of the field, hence it is obvious that the output for 1930 has been greatly restricted. About a third of the operations in 1930 have been on the retreatment of old tailings. The number of such tailing mills, about 25, has been approximately the same as operated in 1929.

Average operating costs per concentrate ton have been reduced from 15 to 20 percent below the average for 1929. This is due partly to mining richer ores and partly to operating economies. But this reduction has not kept pace with the decline in prices, which at the end of 1930 were over 25 percent lower than the weighted average price for zinc and lead concentrates for 1929. Few operations are making a profit, if any allowance is made for depreciation and depletion, but the necessity of employment for men and the fact that many general expenses go on, even when mines are down, keeps numerous properties in operation despite general conditions in the industry.

All things considered, the local labor situation is fair. There is serious unemployment, to be sure, but more men are on pay rolls, either part or full time, than the decline in production actually warrants.

The necessity for reducing costs has turned serious attention of all operators to their mining and milling practices, and valuable research work is being done by many of them in the effort to improve their methods. The metallurgists and mill men of the district created, in April, a sort of round-table organization which has since been meeting weekly for the purpose of discussing their problems and of fostering (*Continued on page* 24)

*Secretary, Tri-State Zinc and Lead Ore Producers Association.

Summary of the domestic MANGANESE Industry for 1930

By J. Carson Adkerson*

THE manganese industry has just passed through one of the most strenuous periods of its history. The beginning of the year found the industry in the midst of a struggle in its appeal for tariff legislation. Thanks to the House of Representatives and the Senate, a tariff of 1 cent per pound of metallic manganese was granted on ores containing 10 percent or more of metallic manganese. But, even in the face of tariff uncertainty, important strides have been made within the manganese industry. The greatest developments have been in improved methods of beneficiation, largely in wet concentration, furnace concentration, magnetic separation, flotation and leaching.

The production of lower grade manganese ores in the United States during the year 1929 was 1,200,000 tons. The production of high-grade ores has increased from 13,000 tons in 1922 to 60,000 tons in 1929. The production of high-grade ores during the year 1928 was 45,000 tons; in 1929 it was 60,000 tons, or an increase of over 30 percent. From plants already producing or ready to produce during the early part of the year 1930, there was a rated capacity of over 200,000 tons per year, or a possible increase over 1928 of 400 percent.

The plant of the Domestic Manganese & Development Company at Butte, Mont., is equipped and ready to produce 75,000 tons per year of high-grade ore. This ore will run 58 percent metallic manganese. This is the highest grade ore ever introduced into the world's market. Within 90 days time the plant could be equipped and expanded to a production of 150,000 tons per year.

During the year the Anaconda Copper Mining Company proved that the large quantities of low-grade manganese ore in the United States can be commercially treated by the newer methods of beneficiation. The company has recovered manganese by flotation method, discovery of which was made by the U. S. Bureau of Mines, through its experimental station at Rolla, Mo., under the direction of Will H. Coghill.

A test run was made in one of Anaconda's commercial plants. Approximately 12,000 tons of manganese (rhodochrosite) ore, averaging between 29.5 and 30 percent metallic manganese and over 20 percent silica, were treated in this plant by flotation. The concentrates averaged between 38 and 40 percent metallic manganese and under 6 percent silica. The recovery of manganese in the flotation plant averaged about 95 percent.

The material was treated at the rate of 300 tons a day and the finished product shipped at the rate of 200 tons a day to the Domestic Manganese & Development Company, at Butte, Mont., for nodulizing. The nodulized product ran approximately 60.8 percent metallic manganese and 6.9 percent silica.

The crude ores were drawn from the Emma mine, owned by the Butte Copper & Zinc Company and operated by the Anaconda Copper Mining Company. The development of the flotation process has greatly increased the reserves of available ores in the Butte district.

Solid ore in manganese ridge, Hy Grade Manganese Company, Woodstock, Va.

The plant of the Georgia Manganese & Iron Company, at White, Ga., was completed during the year at a total expenditure of approximately $1,500,000. The potential capacity of this plant is 100,000 tons per year.

The new mill of the Hy-Grade Production and Sales Corporation, at Woodstock, Va., was completed during the year at a cost of $300,000, and with a rated capacity of 30,000 tons per year.

Developments in explorations and treatment were carried on during the year on the new discovery of manganese ore at Chamberlain, S. Dak. This property is owned by the General Manganese Corporation, of Detroit, Mich. Recent reports on this property by the U. S. Geological Survey show the property to contain over 100,000,000 tons of metallic manganese, for which a process has been developed for recovery.

Mr. R. S. Dean, chief metallurgist, U. S. Bureau of Mines, in his address before the third annual convention of the American Manganese Producers Association summarizes the domestic manganese situation as follows:

"Now, we have an annual deficiency of about 300,000 tons of manganese as metal, needed to supply the steel industry of the country over what is now produced in this country. To do this we might estimate—it must be understood that these estimates are very rough, that would need about 8,000 tons of ore a day to be mined and milled. The two districts (Cuyuna and Butte) that I have mentioned are capable of producing 8,000 tons a day. As a matter of fact, as mining goes, that would not be a very large tonnage for two camps to produce; and, of course, other districts are quite capable of adding their share."

I have given just a few of the new major manganese developments, but they are sufficient to show an abundance of manganese in the United States awaiting a suitable market.

On account of the dumping of Soviet ores on our shores, at prices regardless of the cost of production, most plants have had to cease production during the early part of the year. Likewise, construction on new plants has been suspended because there is no market for the ore. The dumping of Soviet ores has paralyzed the American manganese industry.

Appeals are now being made to the Treasury Department for immediate relief from Soviet dumping, and to Congress for permanent relief against the unfair dumping practises of Soviet Russia.

With proper protection and an adequate market a tremendous expansion of the domestic manganese industry is definitely assured.

* President, American Manganese Producers Association.

Bituminous Coal in 1930

By Allan H. Willett*

ACCORDING to the evidence so far available, the production of bituminous coal in the year 1930 amounted, in round numbers, to 460,000,000 net tons. This was about 75,000,000 tons less than the amount produced in 1929, a decline of 14 percent. This decline in production indicates an almost identical decline in the amount consumed, since stocks of coal in consumers' hands on October 1, 1930, the latest date for which statistics are available, varied by less than 2,000,000 tons from the amount in storage on October 1, 1929. The 14 percent decline in total production does not reflect the full effect of the industrial depression upon the bituminous mining industry. It is true that bituminous coal is primarily an industrial fuel, but it is also true that a very substantial amount is used for domestic heating, an amount considerably in excess of the quantity of anthracite used for that purpose. While no precise figures are available as to the amount of bituminous coal so used, it is safe to assume that it is in excess of 70,000,000 tons a year. That consumption varies comparatively little with industrial conditions. If we subtract 70,000,000 tons from the total production of the years 1929 and 1930, we have remaining in the former year 465,000,000 tons for other uses, mostly industrial, and in 1930, 390,000,000 tons so used. The measure of the decline in industrial consumption is, therefore, more closely indicated by the relation of these two totals. In other words, it was somewhat over 16 percent.

The effect of the industrial situation is reflected in the figures published by the Bureau of Mines with reference to the average weekly consumption of bituminous coal in the United States. For the first nine months of 1930 that average was 8,400,000 net tons, as compared with 9,500,000 tons in 1929, and 9,000,000 tons in 1928. Moreover, the decrease from the 1929 rate has been greater this year with every succeeding quarter. Thus in the first quarter of the year average weekly consumption for 1930 was 7.7 percent below that for the same quarter of 1929; in the second quarter the decline was 12 percent, and in the third quarter, 15.4 percent.

An analysis of the available records of coal distribution gives little indication as to where the decline in consumption was most marked. Cargo coal shipped up the lakes during the season of 1930 amounted to 36,830,000 net tons. This was slightly over 1,000,000 tons less than the amount shipped in 1929, but 3,000,000 to 3,500,000 tons in excess of the 1928 and 1927 shipments. In other words, the decline in lake shipments was merely nominal.

A similar situation exists with respect to shipments into eastern New York and New England. Water shipments into New England in 1930 through November were less than 1,000,000 tons behind shipments by water in 1929, and nearly 1,000,000 tons ahead of shipments in 1928. All rail shipments across the Hudson showed a similar relationship, being slightly under shipments in 1929, and in excess of shipments in 1928. In other words, here again the change may be held to be no more than normal.

Exactly the same relationship holds with reference to exports of bituminous coal, both exports to Canada and those to other parts of the world. In both cases the 1930 exports have been running slightly behind those of 1929, but equally in advance of those of 1928. With our present inadequate information with respect to the distribution of coal, the statistics already quoted are the only ones available. None of them accounts for any substantial part of the decline in production in 1930 as compared with 1929.

Statistics relating to the production and distribution of coal are interesting chiefly because of the measure they afford of the decline in industrial activity. Of more permanent interest are facts relating to improvements in the technique of mine operations on the one hand and those relating to improvements in marketing methods on the other hand. Unfortunately definite figures relating to the former class of changes in 1930 will not be available for several months. However, it is possible to get a line on current tendencies from an analysis of the experience of the recent past. Let us consider, for example, as one interesting current development the increase in mechanical loading between 1927 and 1929. While the amount loaded mechanically still constitutes a small percentage of the total production of the bituminous mining industry, it is interesting to note that that amount practically doubled between 1927 and 1929. While similar figures are not available for hand-loaded mechanical conveyors for 1927 it may be pointed out that there was a gain of practically 25 percent in that amount between 1928 and 1929.

The development of mechanical loading and conveying should be considered in connection with other interesting facts about the bituminous mining industry. In 1927 there were 7,011 mines in actual operation. In 1929 that number had been reduced to 6,057. In 1927 there were 594,000 men engaged in the industry. In 1929 that number had declined to 503,000. The output per man per day in 1927 was 4.55 tons; in 1929 it had increased to 4.85. In 1927 the output per man per year was 872 tons; in 1929 it was 1,064 tons. Without implying that this decrease in the number of men employed and increase in productivity per man is to be accounted for entirely by increased mechanization, it is worth noting that according to the study made of mechanical loading by the Bureau of Mines in 1927 output per man in the machine loading mines of seven states selected for the investigation amounted to 1,216 tons, while the output in other underground mines in the same states was only 963 tons. Of course, numerous other factors may have contributed to this relatively high rate of production per man in machine loading mines, but that such mechanical loading was an important contributing factor can not be doubted. How far the same tendency manifested itself in 1930 can be determined only when we have more complete statistics than are now available.

The price situation in the bituminous mining industry continues to be unsatisfactory. The only available general measure of the movement of mine prices in 1930 is the *Coal Age* spot price figure. A comparison of *Coal Age* spot prices for 1929 and 1930 leads to the striking conclusion that whereas production in 1930 was 14 percent below that of 1929, the average spot price for the year was only 4 cents, or 2.3 percent below the average spot price for 1929. This slight price movement is all the more noteworthy in view of the fact that wholesale commodity price indexes, as computed by different authorities, registered a decline in average wholesale prices between the two years in the neighborhood of 10 per-

* National Coal Association.

cent. This significance is further emphasized in view of the well-known increase in mining costs as working time declines. Apparently the explanation is to be found in the fact that when prices are at the bottom they can not go any lower.

It is a well-known fact that mine prices are too low to furnish adequate remuneration to the capital and labor engaged in the industry. Moreover, no permanent relief from that situation can be found for the industry as a whole through further reductions in the cost of mine operations or even through the elimination of additional mines and men. Unless the industry is to sink into a condition of unpreparedness in which it will be unable to meet any unusual demand for its product, idle capacity must remain a characteristic of the industry during a large part of the time. Permanent relief is to be obtained not by eliminating such capacity but by adopting methods under which such excess capacity can coexist with profitable operation. In other words, the remedy is to be sought through changes in marketing methods rather than through changes in the operating end of the business.

That the industry itself is awake to this situation is clearly indicated by the increasing attention given by it to marketing problems. I may refer briefly to two specific movements in which such efforts have been embodied. The first of these is the increasing tendency on the part of local groups to attempt to eliminate many abuses in the marketing of bituminous coal through the voluntary adoption of codes of fair trade practices and the establishment of bureaus to administer such codes. The purpose of these codes is not to restrict fair competition but to secure the abandonment of practices which are recognized to be in the long run hindrances to fair competition, however much they may seem to benefit for the time being the companies practicing them. Such codes are now in effect in a large number of districts and are being actively considered in other districts. The testimony of experience is unanimous to the effect that where the codes have been given anything like a fair chance, they have accomplished much good.

On a national scale the most important development of the year relating to the marketing of bituminous coal has been the adoption of a definite plan of cooperation between the various groups interested in the production and sale of bituminous coal and the groups concerned with the manufacture and installation of heating and ventilating equipment and devices. This is represented by the program of the Committee of Ten—Coal and Heating-Equipment Industries, which is sponsored by the National Coal Association.

ANTHRACITE in 1930

By Edward W. Parker*

AS CLOSELY as may be estimated, the production of anthracite during the calendar year 1930 will fall below that of 1929 by 3,500,000 gross tons. The total production of anthracite for 11 months, January-November, 1930, as estimated by the United States Bureau of Mines (these figures including coal sold at the mines for local delivery and that consumed in the operation of the properties and which are not included in the shipment figures) amounted to 56,663,000 gross tons. The total production in December, 1929, as estimated by the Bureau of Mines was 6,837,500 gross tons. Weather conditions in the closing month of 1930 were favorable rather to the consumer than to the producer of anthracite and production was less by about 1,000,000 tons when compared with December, 1929. Total production for the year is estimated at 62,463,000 gross tons against 65,918,000 tons in 1929, showing a decrease of 3,400,000 to 3,600,000, or 5¼ percent.

When the general depression which prevailed in 1930, the restricted purchasing power of the anthracite-consuming public, and the growing habit of hand-to-mouth buying are taken into consideration, and when compared with declines in other industries, this loss in anthracite production becomes practically negligible. And, moreover, the first four of the coal-burning months of 1930 were notable for the mild temperatures, resulting in a decreased production in those months of a little over 2,650,000 gross tons, about 80 percent of the decrease for the entire year. It would appear from this that, all untoward conditions considered, the anthracite industry in 1930 held up remarkably well, and it may be anticipated that, if only normal winter weather conditions prevail during January, February and March, 1931, the production of anthracite for the coal year 1930-31 will not be less than its immediate predecessor.

Shipments, as reported to the Anthracite Bureau of Information, for the 12 months from December 1, 1929, to November 30, 1930, amounted to 55,287,857 gross tons, as compared with 57,914,778 tons for the corresponding period of 1928-29. Indications are that the shipments in December, 1930, will fall behind those of 1929 by about 1,000,000 tons.

The shipments of anthracite for the 12 months, December, 1928, to November, 1929, and from December, 1929, to November, 1930, were as follows:

	Gross tons
December, 1928	4,844,050
January, 1929	5,811,972
February, 1929	5,168,197
March, 1929	3,628,691
April, 1929	5,160,520
May, 1929	4,817,334
June, 1929	3,778,679
July, 1929	3,687,586
August, 1929	4,564,426
September, 1929	5,360,130
October, 1929	6,477,729
November, 1929	4,615,464
	57,914,778

	Gross tons
December, 1929	5,831,534
January, 1930	5,405,788
February, 1930	4,708,707
March, 1930	3,430,940
April, 1930	3,662,647
May, 1930	4,750,368
June, 1930	4,052,939
July, 1930	4,345,841
August, 1930	4,821,790
September, 1930	3,899,405
October, 1930	6,177,851
November, 1930	4,200,047
	55,287,857

In the writer's review of the anthracite industry for 1929 he stated that its history for that year was marked more by preparation for the future than by productive activity as compared with preceding years. Mr. Noah H. Swayne, in his comprehensive article contributed to THE MINING CONGRESS JOURNAL for December, has shown with marked clearness how these preparations were carried forward during 1930. It is a record of notable achievement to which Mr. Swayne himself has in no small degree contributed.

There is nothing to add to what Mr. Swayne had to say except to emphasize his statement that the anthracite industry is neither decadent nor despondent. Its confidence in the future is attested

* Director, Anthracite Bureau of Information.

by the large capital investments made in recent months and still being made. That the industry is faced with serious problems is granted, but it has faced no, or little, less problems in earlier stages in its history, as when it was, at recurring periods, driven from the blast furnace, the locomotive, the ocean liners, and the gas works. The problems the industry faces today had their beginning principally in the labor troubles of 1922 and 1925-26, which for a period of more than five months, in each instance, shut off completely the supply of hard coal and produced in the minds of the anthracite-consuming public a feeling of antagonism for the time being, and a not unreasonable doubt as to their dependence on anthracite for the future fuel requirements.

The need for any apprehension on the part of the public along these lines has passed, for on August 8, 1930, an agreement was entered into between the anthracite operators and their employes, which renews for a period of five and a half years, or for six winters, assurances of industrial peace and an uninterrupted supply of that domestic fuel, Pennsylvania anthracite, for which there is no satisfactory substitute. The signing of that contract was the outstanding feature of the anthracite industry in 1930. The conditions under which the negotiations were conducted and the agreement reached were unique. There was no strike or suspension, and there was no stage play or trial of the cause in the newspapers prior to the reaching of an agreement. The negotiations were carried on quietly in a New York office, but when agreement was reached the signing of the contract was made in public in the city of Scranton, and the event was made the occasion for a celebration. It marked a new era and a new spirit in wage negotiations. Strikes are taboo and the means for avoiding them are provided in the contract. Their utter futility had been demonstrated in the controversies of 1922 and 1925-26. Neither miners nor operators have recovered the losses then sustained, but with peace for the future secured, with the industry on its toes in the solving of the problems that confront it and for service to the public, confidence in its continued progress is justified.

The Rocky Mountain District

By **Benedict Shubart***

and

C. M. Schloss†

NEVER a very corpulent gentleman as he sits his throne on the peaks of the Rockies, this year King Coal has had to take up several notches in his belt; he lives on orders for coal—diminishing demand has forced on him a meager diet. He and his court have got down to brass tacks.

Inquiring first of his realms in Montana, Coal Mine Inspector Ed Davis reports: Production for 1929, 3,319,660 tons; estimate for 1930, 3,258,540 tons. (The fiscal year ends June 30.) Much of Montana's coal is used in copper smelting. Those of us who bought Anaconda at 125 know the condition of the copper industry and can picture its effect on the coal producers at Montana. The picture is not brightened by the October elections, when Butte and Anaconda voted natural gas franchises to the Montana Power Company, which will build a $12,000,000 pipe line 250 miles across the mountains.

Directing our gaze to Wyoming, we see Inspector of Coal Mines Lyman Fearn's report estimating 5,750,000 tons to 6,000,000 tons, a loss of 15 percent from the 1929 production of 699,770 tons. Greater use of oil by railroads is responsible in part for this.

Colorado, largest producer in the Rocky Mountain region fares no better. For the first 10 months of 1930, 6,320,146 tons were produced, a decrease of 1,351,872 tons for the same period in 1929.

Although figures for New Mexico are not available, it is estimated that the state will fall short at least 25 percent from the 1929 tonnage of about 2,500,000.

Crossing the Divide, we see the same deplorable conditions prevailing in Utah. J. Taylor, state coal mine inspector, thinks the 1930 output in Utah will be 850,000 tons to 1,000,000 tons less than the 5,102,458 tons produced in 1929.

While King Coal's enforced diet has reduced his waistline, his physical well being has really been improved. Equipment, both mining and preparation, has been installed to better enable his majesty to compete with his enemies—gas and oil.

The mines in Montana are mechanized and a large percent of the state's output is produced by mechanical loaders. The year saw a big addition to the mechanical loading equipment of the Republic Coal Company at Roundup, where a number of loaders and an equal number of locomotives were installed. Anaconda Copper Mining Company, at their coal mine at Washoe, Smokeless and Sootless Coal Company, Washoe and the Mutual Fuel Company at Bearcreek, have all installed a considerable number of shaker conveyors. Republic Coal Company at Roundup replaced their tipple with a new steel structure. Bair Collins Company at Roundup is opening a new mine. Roundup Coal Mining Company, in line with their mechanization program, has installed a number of Timken equipped mine cars of much greater capacity.

In Wyoming the Union Pacific Coal Company has extended its mechanization program and also made improvements in its Hanna tipple. Additions were made to Colony Coal Company's screening plant.

The state lost one of its great leaders in the death of P. J. Quealy, of the Kemmerer Coal Company.

During the year fire destroyed three tipples in Colorado—Gordon Coal Company, Bear Canon Coal Company and the Colorado & Utah Coal Company. They were replaced with new plants.

Clayton Coal Company has opened a new mine near their present shaft.

Standard Coal Company and Peerless Coal Company, both of Utah, took advantage of the slow summer season to dismantle their old tipples and replace them with new steel structures with latest type screening and loading equipment. Utah mines have installed much Bureau of Mines permissible equipment for cutting and loading. Power shovel mining gained considerable ground.

The followers of King Coal, facing the crucial battle with natural gas, are fighting fire with fire by urging the use of automatic home stokers, providing great convenience at lower fuel cost than is possible with gas. The move is in its infancy. It will prove a powerful weapon; the monarch will find it sure-shot in appeal, a big Bertha in effective destruction of the foe.

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OHIO Coal Mining in 1930

By H. E. Nold*

IN THE February, 1930, issue of this journal, in a short article reviewing the Ohio coal mining industry for 1929, the writer made the following statement: "The coal producers are in the midst of an active educational and selling campaign to reestablish Ohio coals in markets formerly using this coal but, in recent years, served by the cheaper coal from other states." This campaign has continued into 1930 and is still active. That it has continued to bear fruit is shown by the accompanying curves, which show the weekly production of bituminous coal for Ohio and the United States for the entire year of 1929 and for 1930 to and including November 29. These curves were prepared from data given in the *Weekly Coal Reports* of the United States Bureau of Mines.

These data show that up to the last day of November, 1930, Ohio produced about 20,440,000 tons as compared to about 21,400,000 tons at the same time last year. In other words, during the first 11 months of 1930 Ohio produced 95.5 percent as much coal as during the same period in 1929. During the same 11 months in 1930 the total bituminous coal production in the United States was only 86.6 percent as great as during the first 11 months of 1929. These figures indicate clearly that during 1930 Ohio has not only been holding the markets regained last year, but has gained additional markets.

Tests at Ohio State University

The Engineering Experiment Station of the Ohio State University at Columbus, Ohio, has become an important element in the education of those who use Ohio coal in power plants. This organization has commenced a comprehensive series of tests in the use of Ohio coal in firing a 600-hp. water-tube boiler equipped with a seven retort, 127 sq. ft. total projected grate area, underfeed stoker. During the first half of 1930 a rather complete series of tests were made on this equipment to determine the burning characteristics and efficiencies obtainable with coal from the middle Kittanning or Hocking Valley seam. This work was under the direction of H. M. Faust, research engineer in the experiment station, who has prepared a very comprehensive report showing the results of the tests on this coal. A similar series of tests are now being made on coal from the upper Freeport or Cambridge seam of coal, and it is expected that the tests will soon be expanded to include coals from the other large producing fields of the state.

Preparation and New Equipment

The campaign for the production of clean coal, which played such an important part in the rehabilitation program of 1929, has continued in full operation during 1930. This has been marked by more rigid discipline at the working faces, by the modernizing of several tipples in the state, and by the installation of mechanical slate pickers, for the cleaning of egg coal on a number of other tipples. In one coal-washing plant, where wet methods only were previously used, pneumatic tables, for the dry cleaning of the smaller sizes have been installed and are now in operation.

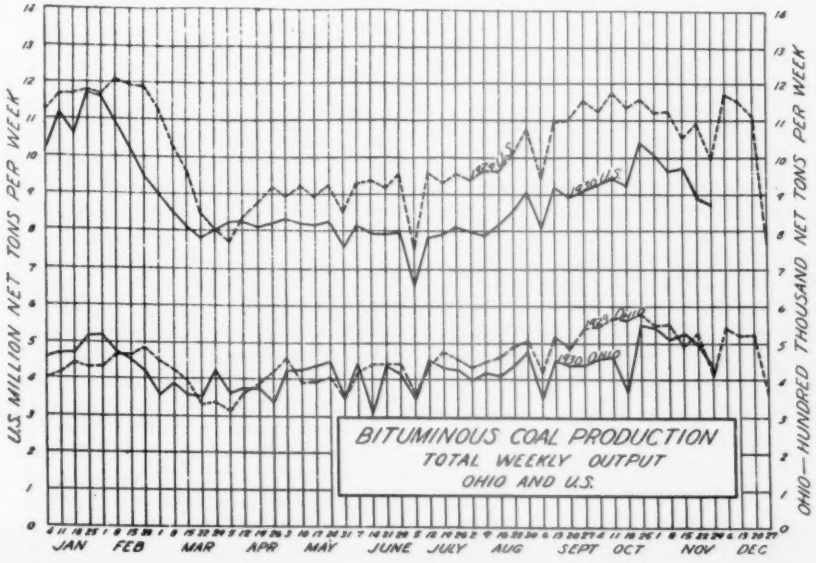
Additional mechanical loading equipment and a number of pit car loaders have increased the mechanization in several mines. New coal-cutting machines, which will shear the coal as well as bottom or top cut it, have been added to the equipment of several mines. The amount of money spent for new equipment and in modernizing the mines seems to indicate a feeling of optimism among the larger coal operators of Ohio in spite of such low prices received for their coal during the year that margins of profit have been exceedingly small or entirely absent.

Safety Work

The Ohio mine accident record during 1930 is not one to be proud of. However, a number of companies, and among them some of the largest in the state, have made very creditable records in accident prevention during the year. The amount of interest in and the activities in safety work now starting and under way seem to indicate that we may hope for a material reduction in mine accidents during the coming year. One company has recently issued a notice requiring all their employes to wear safety shoes with hard tips, which should prevent many smashed feet and toes. It might be said for the general superintendent of this company that he practices what he preaches, and when last seen by the writer he was wearing the same safety shoes that he requires his men to wear.

A Poor Law

The Ohio coal industry suffers from a law which makes the offices of the chief of the division of mines (the chief mine inspector) a political office to which a new incumbent is appointed at each change of the state administration. This condition makes it impossible for any chief of the division, regardless of his fitness for the position, to develop and put into operation any constructive program looking to increased safety in our mines. This is not a criticism of the able and conscientious men who have held this important office, but is a criticism of a system which makes it impossible for this office to function as efficiently as it should.



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STATISTICS

The following statistics have been made available to the writer by the courtesy of E. W. Smith, chief of the division of mines in Ohio, in whose office they were compiled:

Number of coal mines in operation, employing more than 10 men	385
Number of coal mines in operation, employing less than 10 men	821
Total number of coal mines operating in December, 1930	1,206
Number of mines normally employing more than 10 men but idle during all of 1930	44
Number of mines abandoned during 1930.	112
Number of new mines opened (mostly small)	124
Number of men employed in coal mines employing more than 10 men	26,179
Number of men employed in coal mines employing less than 10 men	3,597
Total number of men employed in coal mining (December, 1930)	29,776

Other Mining Activities in Ohio

Total number of clay mines operating	88
Total number of men employed in clay mines	1,200
Total number of gypsum mines operating.	3
Total number of men employed in gypsum mines	179
Total number of limestone mines	1
Total number of men employed in limestone mines	75

COAL in IOWA in 1930

By George Heaps, Jr.*

AS FAR as operating conditions are concerned, Iowa has been particularly fortunate during 1930. The supply of labor has been plentiful, more men being available for work in the mines than for many years past. Car shortages, even minor ones, have been unknown. Labor disturbances have been practically non-existent.

In the Appanoose County field in southern Iowa there has existed a rather unsettled labor situation, due to the fact that this district has passed from the control of the United Mine Workers of America, and those in charge of the new miners' organization have been attempting from time to time to bring the miners of that field into their union. These attempts can hardly be said to have been successful, as there are only a couple of small local unions in the field, according to best reports. The labor situation apparently has not affected production, as coal from this field is being offered in Iowa's markets in abundance, in most cases at prices that can hardly be met by coal from the fields north of Appanoose County, which are still organized and under the control of the United Mine Workers.

When market conditions for the year are reviewed, the picture is far from satisfying. Iowa is crossed by a number of trunk lines over whose rails coal from almost every producing field in the country may move into the state without passing through large terminals that might delay the movement of cars. Consequently Iowa is coveted territory for coal salesmen from East, South and West, not to mention the docks on the north. The price trend during the year on every size of coal has been downward, due not only to competition from outside coal fields and coal substitutes, but also competition among Iowa shippers themselves. The bright spot of the year from a marketing standpoint has been the organization of the Iowa Coal Institute by a group of outstanding business and professional men, none of whom are connected with the coal business, but all of whom are convinced that all of Iowa must unite in an attempt to revive the coal industry of the state. The story of Iowa coal is being told from the platform, through the newspapers, and over the radio. A widespread interest in Iowa coal has resulted. The activities of this organization can not help but be a benefit to the Iowa mining industry.

Any prediction for 1931 would be merely a guess. Iowa coal business is menaced, as is the industry from every other producing field in the country, by the oil and gas pipe lines. How far these developments will reach during 1931 is unknown to the writer. We do know, however, that Iowa mining will be adversely affected by them in just the proportion that they are successful. It is rumored that a number of large coal consumers are planning on turning to natural gas. If these rumors are true, a large tonnage of industrial coal will have to find a market elsewhere or production will have to be curtailed to that amount. If the Appanoose County mines continue to produce substantial tonnages on a labor-cost basis that cannot be met by the unionized mines north of them, one of only three courses remain for the miners and operators of those mines. The mines must go out of business or a union wage scale must be negotiated that will permit them to compete with southern Iowa, not to speak of producing fields outside of Iowa that are working on a wage base comparable to southern Iowa, or the operators of the northern fields of Iowa must take matters into their own hands and make the attempt to produce coal on a basis that will permit it to compete with other coals now flooding their markets.

* President, Iowa Coal Operators' Association, Des Moines, Iowa.

The NEW RIVER District

By S. C. Higgins*

THE New River Coal Operators' Association is an association of coal operators in the counties of Fayette, Raleigh and Greenbrier in southern West Virginia, dating its coal history back to 1872, when those early pioneers of the mountains, under the most adverse conditions and with inadequate facilities, had the vision and foresight to open up one mine, which became the nucleus of the New River smokeless coal field, with a production today of approximately 26,000,000 tons per annum.

The general depression in business during the past year had its effect on the coal production of the New River field through lessening of industrial activity, requiring less of the New River resultant coals. The depression plus the competitive situation created by the depression, and freight rates, all had their toll in a decreased production for the year 1930. However, prospects for 1931 are considerably brighter due to the general tendency of stimulation of business industrially, plus an anticipated increased movement of high-class New River coals, which are highly satisfactory in automatic stokers.

It is not optimistic to believe that coal will still retain its rank as being one of the chief necessaries of life providing those necessary essentials which can not be so successfully and economically obtained from other fuels.

* Secretary, New River Coal Operators' Association.

Coal in Southern Appalachian Region in 1930

By R. E. Howe*

FOR the past 12 months the coal industry of our section has been somewhat like Micawber, of "David Copperfield" fame, "waiting for something to turn up," but the things that have turned up have not been to our liking.

Natural gas and oil have been invading the markets which we have considered our very own, and hydroelectric has also been doing its part towards making bad matters worse for the coal operators. The trucks have also been doing a child's part in this game of putting the coal operators, as well as the railroads, out of business. When trucks take business away from the railroads, the railroads lose the freight business and the coal operator loses the coal tonnage required to move it.

Have we become discouraged from these many handicaps? We have not, as evidenced by the fact that the production of this field is less than 5 percent below the previous year.

Enough of the past, but what of the future? The tariff on oil was beaten in the last Congress by only one vote. We believe that at least one man in the Senate will awake to the fact that in failing to put a tariff on crude oil, he is giving employment to the peons of Venezuela rather than to our native sons who work in the coal mines of the Appalachian fields.

Natural Gas

This is a dual problem which the coal industry and the railroads will have to work out. Every time natural gas displaces coal, the railroads lose as much, if not more, than the coal operator. If permitted by the Interstate Commerce Commission to do so, we believe the railroads would meet the competition with the only weapon which they possess, that is, reduced freight rates. The operator has already endeavored to meet it by selling his coal, to say the least, without profit.

While the tariff and rate matters are being discussed by those most affected, there is another means of combating oil and gas, and during the coming year we look for rapid strides along this line. We refer to automatic stokers for hotels, apartments and residences. These stokers furnish uniform, automatic heat at a very small percentage of the cost of oil and gas.

Hydro has displaced some coal, but we believe that it has reached its apex, and that from now on it will not increase in the same ratio as coal-burning electrical plants, for the reason that efficiency in coal-burning plants has increased so materially that in most instances electricity can be produced cheaper with coal than with water power.

Notwithstanding this fact, we are faced with an effort by Congress to put the Government in the hydro electric business right here at our door. We are not opposing the building of Cove Creek Dam, but we do think that when it is built, it should be operated by private capital that would have use for the water power, such as the electro chemical industry. There is a tremendous amount of power at Muscle Shoals for which there are no consumers. It would seem worse than useless to add more power development in east Tennessee without having some idea as to what use it will be put.

The State of Tennessee is the only state in this section of the country, and possibly in the United States, which mines coal and sells it in competition with coal mined by free labor, and, almost without exception, at a cost below what free labor costs the operator.

Last, but not least, in our optimistic view of the future, is that a substantial majority of the operators are realizing the economic suicide in the policy of running their mines full time, regardless of the demand for coal. They now appreciate the fact that in times of slack demand, they lose less money running part time than they do running full time.

* Secretary, Southern Appalachian Coal Operators' Association, Knoxville, Tenn.

The Pittsburgh District

By K. F. Treschow*

THE bituminous coal industry of the Pittsburgh district, during the year 1930, has faced a very critical period, due largely to existing freight rates and to the fact that Pennsylvania miners are being paid higher wages than those in any other fields in the country. These two items make it very difficult for our operators to compete with other fields. The result of this condition is shown by the fact that there has been an enormous reduction in the production of coal in the State of Pennsylvania over a period of years, while other states have had an increase. Of course, during the past year our industries have not been operating normally and oil and gas have made some inroads in the coal market. Nevertheless, this some condition exists throughout the country, and the other fields have not been affected to any such extent as has the Pittsburgh district. Despite these handicaps, Pittsburgh operators have continued to modernize their mines, and by efficient management have offset, to some extent, the difficulty of their position.

The decrease from 42,000,000 tons from 452 mines in 1923 in this district to 33,000,000 tons from 225 mines in 1929 gives an indication of the declining market the Pittsburgh coal producers have to face. In former years the Pittsburgh district marketed coal from the Atlantic seaboard to Omaha and from Canada to the Great Lakes and the Gulf of Mexico. However, the producers are now largely restricted to a small triangular territory bounded roughly by Pittsburgh on the south and Rochester, N. Y., on the north.

Inasmuch as the coal industry is a basic industry, and one which affects the community to a large extent, it is up to the citizens to take an active interest and satisfy themselves that conditions are as stated above and then to assist our operators, in every way possible, to overcome their present handicap. If this is done, it is certain that the future of the coal industry will be much brighter than in the past.

* Secretary, Engineers' Society of Western Pennsylvania.

NORTHEAST KENTUCKY Coal District

By C. J. Neekamp*

NORTHEAST Kentucky coal district enters 1931 with outlook favorable to increase production, compared with 1930. A general view of optimism prevails over the entire district radiating from Ashland, Ky., the gateway to the district, to Elkhorn City, its terminal.

Completion of Ohio River canalization, providing year-round navigation, gives added impetus to industrial activities in Ashland, Ky., and the Big Sandy Valley coal area.

The northeast Kentucky coal district, referred to locally as the Big Sandy Valley of eastern Kentucky, known from a traffic viewpoint as the Kentucky Division of the Chesapeake & Ohio Railway Company, embodies the counties of Pike, Letcher, Floyd, Martin, Johnson, Knott, McGoffin, Lawrence, Boyd, Elliott, Rowan, Carter, Morgan and Greenup.

The territory, geographically, is all included in what is known as the northeast section of the State of Kentucky. Ashland, Ky., one of the most progressive cities in the State, with a metropolitan population of 37,500, located at practically its most northeastern point, is the gateway and outlet to all the business activity of the region outlined herein.

Ashland, the gateway to this great storage basin of raw material resources, best indicates the progress of the past 10-year period by its occupancy of a position in the classification of cities increasing their population 100 percent or over during the period 1920 to 1930, this record taken from official census figures.

Ashland, Ky., is the home of the general offices of the Kentucky Division, Chesapeake & Ohio Railway, and is one of the most important centralization and terminal points on the entire system operated by the Chesapeake & Ohio Railway Company.

It has the distinction of being the largest individual revenue-producing point on the entire Chesapeake & Ohio Railway system. It is also in the very heart of the Central Ohio Valley industrial region of the Ohio River Valley, and has been recommended by numerous industrial engineers and business economists as the most strategical location in the United States for manufacturing-plant installation and industrial activity. It is located within close proximity to the center of population of the United States and has unexcelled transportation facilities available.

The northeast Kentucky district has several thriving and progressive communities within its borders, chief of which are Louisa, Lawrence County; Paintsville, Johnson County; Pikeville, Pike County. These smaller cities have grown and advanced with the development of the territory and, collectively, with the district as a whole, are now recognized as one of the most progressive sections of the State. The life and progress of these communities is practically dependent upon progressive advancement of this basic industry. Its status is reflected in all the activities of the entire area.

Efficient transportation is recognized as the outstanding factor in the development and growth of any given area. The Chesapeake and Ohio Railway Company have supplied an unexcelled rail transportation service. Highway transportation through the entire region has been completed during the year 1930 with the opening of U. S. 23, the Mayo Trail, which makes possible the movement of motor transportation from the Great Lakes on the north to the sunny southland, reducing the mileage approximately 150 miles.

In addition, during the course of the year 1930 a movement was inaugurated for the completion of the canalization of the Big Sandy River. This will provide navigable waterway transportation to the greater portion of the region and will make possible further development in the advancement of capitalization upon the raw-material resources of the area.

Production of coal in the district for the year 1930 shows approximately 9,250,000 tons, compared with production of 1929, 10,672,525 tons, shows a loss of 14 percent. This is the second year the district has shown a noticeable loss since the opening of this storehouse of fuel energy, the other year being 1921, as shown by the historical data of production in the following paragraph.

The following report, showing the total production of mines in the northeast Kentucky district each year, and number of mines operating, years 1906 to 1930, inclusive, will give you a comprehensive idea of the consistent growth of the Big Sandy coal field:

Year	No. of mines	Tons produced
1906	No record	124,570
1907	No record	255,000
1908	No record	343,824
1909	No record	469,390
1910	31	986,726
1911	33	1,289,876
1912	42	2,004,487
1913	43	2,665,321
1914	47	2,981,234
1915	51	3,316,185
1916	55	4,440,322
1917	76	4,995,764
1918	118	4,352,591
1919	129	5,062,934
1920	145	5,684,935
1921	162	*3,997,104
1922	177	6,133,077
1923	180	7,464,185
1924	180	8,526,431
1925	178	10,822,260
1926	130	11,101,065
1927	130	11,474,660
1928	67	10,260,985
1929	67	10,672,525
1930	63	†9,250,000

* Subnormal year.
† 1930 depression.

This growth is due to the progressive production ideals of those actively engaged in the industry in this region, and it is most interesting to note that the question of quality coal is not a new theory in the northeast Kentucky district but had its original inception with the earliest pioneers of the industry.

These early pioneers and their successors, those at present engaged in the further development and production of coal on the eastern Kentucky watershed of the historic Sandy Valley, are the ones to whom great credit is due for blazing the trails through this portion of the beautiful mountain fastness of the great Southern Appalachian coal area.

When one gives due consideration to the fact that only one-third of the coal reserve of this area, the northeast Kentucky coal district, is developed and available to transportation, and the remaining two-thirds is undeveloped, virgin territory, it is clearly evident that additional construction of transportation facilities is necessary for the production and movement of additional tonnage.

The reserve coal available in this territory is sufficiently adequate to guarantee an unlimited supply to meet all fuel requirements for generations to come without any danger whatsoever of complete depletion.

The great diversity in composition of the coals, from a high-grade splint coal to an exceedingly splendid by-product coal, all in the bituminous class, permits a greatly diversified use of the coals which are specially adaptable to each classification, and almost in all cases set the present standard.

Millers Creek Block Coal

The extreme hardness of the splendid coals known as Millers Creek block in this particular locality permits ready preparation into block sizes, many too large for any man's single strength, with

* Secretary, Northeast Kentucky Coal Operators Association.

the resultant egg and nut sizes and a very small percentage of slack. The block coal from the district attained a very quick popularity, and in many cases has displaced the use of anthracite in the markets of the Middle West. Its distinctive features are its hardness, specially desirable in transportation and storage; its quick ignition; slow consumption; and its extremely small percentage of noncombustible material. It is especially adaptable to domestic use in either wood stoves, open grates, and all kinds of coal stoves; and its free-burning nature makes it almost fool-proof, since it requires but little draft from below or through the firebed. The egg and nut sizes are very popular in city use in domestic furnaces and cooking ranges, since a quick heat is easily secured for either cooking or heating. The smaller sizes are very much in demand for boiler use, both stationary and locomotive, where free-burning coals are required.

ELKHORN BY-PRODUCT AND GAS COAL

With the extension of the Kentucky Division from White House to Elkhorn City, the upper end of the Big Sandy field was immediately exploited and most of the increased shipments from the district as a whole during the past eight years came from the new development in the Elkhorn coals, and several branch lines were necessary to serve this steadily developed area. Adaptable, as experience has demonstrated, to so many and varied uses, the Elkhorn coal is now recognized as the greatest all-purpose coal. As proof of this claim we are showing a few of the particular uses to which this coal has become very popular, viz: Domestic, stationary, and locomotive use, illuminating and producer gas, malleable iron melting, by-product coking, kiln burning, cement clinkering, annealing, etc.

For gas purposes the Elkhorn coals are rich in carbon and hydrogen, aggregating 86 percent, with little tendency to clinker and carry a very high caloric value, making it very desirable for this particular use, so that at present a large number of gas plants are specializing on this coal and are producing results that had never been expected from it. Able to stand higher heats than any other gas coal on the market and at the same time maintain good operating conditions in the plant, this coal conforms to the chief requisite in the manufacture of coal gas, and tests have shown that this coal will yield the largest amount of gas with the greatest B. t. u. in the gas than any other gas coal.

Elkhorn coal is very rich in the yield of by-products, the resultant coke low in sulphur and phosphorous content has enabled the profitable and economical use of the same for the iron and steel industry. Its value for malleable iron smelting is one of its outstanding features. Elkhorn coal contains from 95 to 96 percent combustible matter, exceedingly low in ash and sulphur, has little tendency to smoke, soot and clinker, responds quickly to change in draft, which has made it rapidly forge to the front as one of the most desirable of bituminous coals.

In addition to the vast coal resources of this region, men of vision and courage have developed a most prolific natural gas and oil development. The natural gas is of extremely high heat unit efficiency. The oil is equal to the highest grade paraffin base oils found anywhere within the confines of the world; so with this great development which is producing these products in large volume, combined with a vast reserve proven area for expansion, provides a veritable storehouse of highest rated quality and low cost ratio of fuel energy for the use of the rapidly expanding Ashland industrial district, which has made possible Ashland, Ky., northeastern Kentucky's recognized fastest growing progressive city, showing most marvelous industrial strides during the past 10 years.

The Kanawha Field

By D. C. Kennedy*

IT IS to be expected that Kanawha District should share in the lessened production that is general when compared with previous years.

All of the tonnage decrease in this district, however, can not be charged to the general business depression that has been so pronounced throughout 1930. Our tonnage loss from the 1930 record on December 1 has mounted to over two and one-half million tons. No small portion of this loss is represented by the decrease of tonnage to the Lakes.

This decline in lake tonnage was to a major extent brought about by the difficulty of trying to meet a 35-cent freight differential on lake coal while operating upon a basis that is equal in other respects to conditions maintained by competitors.

Despite the depressed condition of the markets, a fair amount of optimism is to be found throughout the district, though there be no definite sign post to point upward. A number of operators are going forward with construction work with confidence that an improved general condition will not be long deferred.

A number of mines closed during the year because of the unusual economic conditions that the industry has faced. A very few of these will, in all probability, remained closed a long time, but others were reorganized, refinanced, and have resumed operation or will shortly do so.

Unemployment has touched our communities to some extent, but perhaps not so severely as elsewhere, and the operators of the district are to be commended for their efforts to prevent disastrous shutdowns and the consequent removal of a large number of wage earners from pay rolls. Part-time operation has prevailed to lessen the possible unemployment situation, although it represented a positive economic loss to the producer.

The operators must give more attention to their selling agencies who try to meet the low prices made by competitive conditions based upon a decreased labor cost, which is always reflected in low selling prices. There are several ways by which the operators can help themselves legally through their trade bureaus, but the great problem is getting all of them to cooperate.

It is difficult to paint a glowing, attractive picture for our district for 1931, much as we may wish to do so, but some business alchemy of the future may brighten the dull background and bring to light possibilities that are not now visible.

* Executive Secretary, The Kanawha Coal Operators' Association.

EFFECTIVENESS OF DIFFERENT-SIZED ROCK DUSTS IN PREVENTING EXPLOSIONS

Tests in the experimental mine of the United States Bureau of Mines have shown that fine rock dust is slightly more effective in extinguishing incipient coal-dust explosions than coarse dust, but the difference is so small that it has no practical significance. Any rock dust that meets and is maintained under the standard specifications will be satisfactory in so far as coal dust explosion quenching power is concerned. The size best suited for different methods of distribution must be determined by the management of the particular mine.

Further details are given in Report of Investigations 3034, by G. S. Rice, H. P. Greenwald, and H. C. Howarth, copies of which may be obtained from the Bureau of Mines.

TRI-STATE DISTRICT

(*From page 14*)

various types of investigation. These meetings have been very popular and stimulating, and unquestionably are speeding the adoption of improvements in milling practices. Meetings are held at the offices of the Tri-State Zinc and Lead Ore Producers Association, which prepares for distribution mimeographed copies of all the proceedings of general interest. The United States Bureau of Mines experiment station at Rolla, Mo., has had a capable metallurgical engineer in the field for the past three months, and he is assisting materially in the attack on milling problems.

As usual, the Tri-State Zinc and Lead Ore Producers Association is actively engaged on many other matters of importance to the district. It has greatly increased the accuracy of its statistics on production and has expanded its cost statistical service during the past year to include monthly statements of average costs of tailing retreatment operations. These are proving of much interest and value to operators.

The work of accident prevention sponsored by the association is showing continued improvement. There has been material decrease in total accidents, percentage of lost-time accidents, and of actual time lost. Fatalities show a decrease of 65 percent from the number in 1929, which is remarkable considering the fact that the number of men employed in 1930 has been less than 30 percent below that of 1929.

Health and welfare work of the association is carried on by one full-time man and two trained nurses and is a very valuable free service to the people of the mining community. In addition to the nurse services to mothers and to other cases of miscellaneous illnesses, the administration of vaccines and serums to many hundreds of persons, especially children, for prevention of contagious diseases is a vital factor in maintaining the generally healthy condition of the residents. Unemployment and extremely severe weather in December, 1929, and in January and February, 1930, made necessary extensive relief work, which was widely supported and was administered mainly by this organization. The present winter has been less severe to date, and the work of relief somewhat less urgent than last year, and is quite well in hand by this and other local organizations.

The free cooperative clinic maintained at Picher by the U. S. Bureau of Mines, the Metropolitan Life Insurance Company, and the mine operators for the physical examination of miners and their families and for the treatment of some diseases, continues to perform a most valuable service in health improvement. Over 21,000 people were handled through the clinic during 1930.

The outlook for the Tri-State field for the year 1931 is no more certain than that of the country generally. In fact, an increase in its output and profits depends entirely upon a material improvement in business conditions which will start the movement of zinc in the market. While stocks of concentrates in the field are not alarming, there must be a great reduction in stocks of slab zinc in the country before the mine product can be absorbed to even the extent normal in the past few years. Consequently it is difficult to see any material increase likely to be reflected in the mine output for 1931, although prices should advance.

The Tri-State district is far from a "has been" in the mining industry. It confidently expects to maintain an important position in the industry for many years to come, and with the general improvement in business which is certain to appear eventually, its present self-improvement should be then reflected in substantially greater returns.

The number of operating companies is tending to decrease through absorption by purchase, and this movement should place the district on an increasingly more efficient and economical operating basis.

CONCENTRATION TESTS ON MANGANIFEROUS IRON ORES OF CUYUNA DISTRICT, MINN.

Preliminary concentration tests on the black manganiferous iron ores of the Cuyuna District of Minnesota, conducted at the Mississippi Valley Experiment Station of the United States Bureau of Mines at Rolla, Mo., indicate that some of these ores may be beneficiated by ore dressing methods and that concentrates of commercial grade may be produced from what is now waste. The large tonnages of these ores available makes the matter one of considerable economic importance.

The association of manganese and iron is such that there is little possibility of producing concentrates sufficiently high in manganese and low in iron to be used in the manufacture of ferromanganese. The silica content of some of the ores can, however, be reduced to within commercial limits. On the cleaner ores this reduction can be accomplished by crushing to 8 or 10 mesh, classifying, tabling, and concentrating the resulting fines by flotation.

Experimental work is being continued in an effort to find flotation reagents that will be capable of giving cleaner-cut separations than those so far used. Further details are given in Report of Investigations 3045, by F. D. DeVaney and J. B. Clemmer, copies of which may be obtained from the Bureau of Mines.

TESTING THE RELATIVE STRENGTH OF IRON ORES

A method for testing the relative strength of iron ores has been developed by the United States Bureau of Mines, in cooperation with the Mines Experiment Station, University of Minnesota. Previous investigations have shown that the physical condition of the material in the stock column of a blast furnace affects the mechanical operation as well as the efficiency of the furnace.

Two lots of about 150 pounds each were prepared from each ore after it had been screen sized. One lot was rolled in a small batch-type rotary kiln for 1½ hours. The ore was removed and screened. Changes in the screen analyses were considered to have been due to mechanical work at room temperature. The other lot was rolled in the same kiln for 1½ hours during which time the temperature was increased from room temperature to 1,400 degrees F. The ore was removed and screened. Changes in the screen analyses were considered to have been due to mechanical work and temperature.

Tests on 34 ores indicated that the screen analysis of the ore was not a true measure of its mechanical strength. The average decrease in average particle size was 18 percent due to cold work and 38.1 percent due to hot work.

EFFECT OF WASHING OF COAL ON ITS CARBONIZING PROPERTIES

The United States Bureau of Mines has been conducting research on the beneficiation of coal by various washing methods for a number of years so that a great deal of information has been collected as to the best and most economical methods for treatment of American coals. In a general way it is known that for practically any use to which a coal is put, it is improved by washing, but the extent to which it is improved for many specific purposes is not definitely known. For example, it is known that the presence of excessive mineral matter in coal intended for coke and gas making is detrimental, but the specific effect on the yield and quality of carbonization products has not been carefully determined. To obtain some definite information on this point a test is now in progress at the Bureau of Mines Pittsburgh Experiment Station, in cooperation with the Southern Experiment Station, Tuscaloosa, Ala., whereby the carbonizing properties of washed and unwashed coal from the same point in the coal bed will be compared. The coal will be tested under both law and high-temperature carbonizing conditions and the yield and quality of all products of carbonization will be studied.

Coal in ALABAMA in 1930

By James L. Davidson*

THE first hundred years of coal mining in Alabama has just ended and the Commercial Coal and Coke producers of the Birmingham district are memorializing this Centenary by recording the facts about the industry in newspaper advertisements.

In addition to this it should be remembered that since the first raftload of coal floated down the Warrior River to market at Mobile, Alabama coal and coke has been the prime factor and principal instrumentality in the phenomenal industrial development of the State.

(The eight coal-bearing counties of the State now provide 81 percent in value of the tax assessments on all property in the State, and the coal producing concerns in these counties pay over one-tenth of the entire ad valorem taxes paid by all classes of property owners in Alabama including public utilities and railroads. In addition to the above they pay into the State treasury for educational and general governmental use, large amounts in franchise, corporation permit and tonnage taxes).

Coal being basic and and essential (at the same time less costly than other forms of fuel) has contributed more than any other agency toward the material advancement within this and other states bordering on the Gulf, as well as in Tennessee and Georgia.

The payrolls that coal mining and its allied industries have produced and turned loose semi-monthly in Alabama are in the aggregate prodigious. But these payrolls are being diminished by competition from other coal fields, by the inroads of Mexican and Venezuelan oil (which comes into the United States free of duty) and by the invasion of natural gas in the markets for fuel heretofore more fully enjoyed by Alabama coal and coke.

This competition and general business depression caused a falling off in demand for Alabama coal during the year of several million tons as compared to the production in previous years when business conditions were normal. Therefore, since last spring many of the mines have been unable to run more than two or three days per week and a number of them were forced to shut down entirely. However, by allocation of the work, making advances to the needy through the company stores, and remitting house rents, there has been no want for good housing, sufficient food and proper clothing among the coal mine employes of Alabama.

Even though slack running time at the Alabama Coal Mines during the past year has considerably increased the cost per ton of mining, preparing and cleaning the coal, large amounts have been spent by the operators and greater effort exerted than ever before to make the mines safe, to prevent injury to their employes, and in training them in first aid.

(Over half of the coal mine employes of the state having now received first aid training and at many places the training included not only all employes but also many women and young people.)

Much progress has been made in extending the use of rock dust in the coal mines of this state and now Alabama ranks high among the coal producing states in the number of mines using rock dust as a preventive against coal dust explosions. We are glad to note that during the past four years no coal dust explosions resulting in loss of life have occurred in Alabama.

The use of permissible explosives and rock dust stemming, electric shot firing, has increased and 10,000 underground coal mine employes of the state are now equipped with closed lights.

Adequate and proper ventilation has been maintained in the coal mines of the state to the extent that there was only one explosion of gas (small in volume and area) resulting in loss of life, during the past year. Even with this, there were seven less fatal accidents in the coal mines of Alabama for this year up to December 19th, than for the same period in 1919, and the reduction in fatalities from falls of roof and coal were about 50 percent under those in 1927.

As an evidence of what has been done to reduce accidents in and about the coal mines of the state, mention is made that the Newcastle Coal Company was awarded the Holmes Safety Certificate of Honor for mining over three million tons of coal with only one fatal accident and very few lost-time accidents. And that the DeBardeleben Coal Corporation's Hull (No. 33) mine won first place, Corona No. 16 mine won second place and Corona No. 12 mine won third place in the National Safety Competition, conducted by the United States Bureau of Mines, during the year 1929, among the bituminous coal mines of the Nation, for the smallest amount of time lost from accidents in proportion to the total amount of time worked by all employes in and about the mines. Also upon the record of its Hull Mine, in mining 144,885 tons of coal with only three lost-time accidents (totalling only 21 days lost time during 1929) the DeBardeleben Coal Corporation was awarded the Sentinel of Safety Trophy given by The Explosive Engineer Magazine to the winner in the National Safety Competition above mentioned.

The production of a fuel of a superior quality, clean and suitably prepared to meet the requirements of their patrons that has characterized the performance of the coal producers of Alabama for many years past has continued.

But in order to reduce the high cost of production, and hold patronage, several operators have installed mechanical loading machinery in their mines. One large new mine has been opened up and equipped. The plants and equipment at others have been remodeled and more efficient mining methods adopted.

The reconditioning, equipping and putting in service by the DeBardeleben Coal Corporation of the coal cargo-carrying steamship "H. F. DeBardeleben" was the preeminent enterprise projected during the year for extending the market for Alabama coal and for reclaiming for the coal mines patronage at the Gulf ports and in Cuba. The success of this venture appears already proven.

Other factors favoring the retention and recovery of the markets for coal are the dependability, economy and convenience effected by the use of pulverizers† and stokers in burning solid fuel. Furthermore, many consumers of fuel, both large and small, having found oil or gas much more expensive than coal or coke (even when hand fired) have resumed the use of coal and coke; and others have indicated their intention of doing so within the near future.

So being mindful of the above and feeling that the resumption of industrial activities is fast approaching, the coal operators of Alabama look forward to better times during the coming year.

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* Secretary, Alabama Mining Institute.

† Many of the Feeco Unit Coal pulverizers, designed and manufactured by the Fuel Efficiency Engineering Company in Birmingham, having been installed during the past two years, at plants located in Alabama, Florida, Mississippi, Colorado, Tennessee, Kentucky, Michigan, New Jersey, Maryland, Virginia and the Soldiers' (U. S.) Hospital at Augusta, Ga. All of these are performing satisfactorily and are producing steam for power, processing and general heating at much less cost than purchased power, or steam produced by oil or gas.

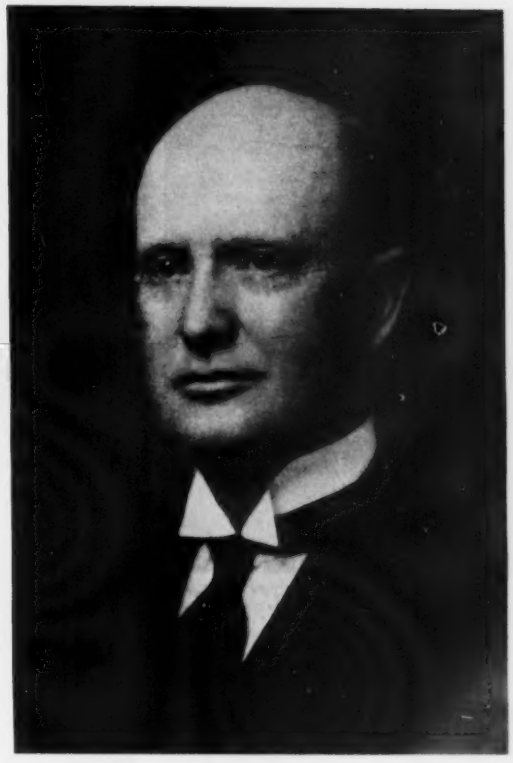
American

S. LIVINGSTON MATHER
Elected President of The American Mining Congress. Mr. Mather is Vice President of The Cleveland-Cliffs Iron Company

NONE of the atmosphere or interest of its usual convention was lacking in the series of group conferences held in its stead by the American Mining Congress at the Mayflower Hotel in Washington from December 4 to 6. Representative delegations from various groups in the mining industry attended and took an active part in a series of group conferences on mechanization, taxation and standardization. The only outside speakers this year were Representative Willis C. Hawley, of Oregon, who reviewed the work of the Joint Con-

Mining Congress holds successful GROUP CONFERENCES

D. D. MOFFATT,
Newly elected Director of The American Mining Congress. Mr. Moffatt is Vice President and General Manager of the Utah Copper Company



ERSKINE RAMSEY,
Newly elected Director of The American Mining Congress. Mr. Ramsey is President of the Alabama By-Products Company, and also Chairman of the Board of Governors of the Southern Division of The American Mining Congress

gressional Committee on Internal Revenue Taxation, of which he is chairman, and John T. Keenan, of the Internal Revenue Bureau, who discussed depreciation rates.

Luncheon or dinner meetings were held by the Board of Directors of the American Mining Congress, the Boards of Governors of the Manufacturers and Southern Divisions, and the National Committee on Mechanized Mining.

The annual members' meeting and the Board of Directors elected the following officers and directors for the American Mining Congress:

President—S. Livingston Mather, The Cleveland-Cliffs Iron Company, Cleveland, Ohio.

First Vice President—A. E. Bendelari, Eagle Picher Lead Company, Chicago, Ill.

Second Vice President—J. B. Warriner, Lehigh Navigation Coal Company, Lansford, Pa.

Third Vice President—J. T. Skelly, Hercules Powder Company, Wilmington, Del.

Secretary—J. F. Callbreath, Washington, D. C.

Executive Committee—Mr. Mather; L. S. Cates, Phelps Dodge Corporation, New York; R. E. Tally, United Verde Copper Company, New York.

Directors—For three years, Mr. Warriner; Erskine Ramsay, Alabama By-Products Company, Birmingham; Mr. Bendelari; D. D. Moffatt, Utah Copper Company, Salt Lake City. For two years, J. B. Putnam, of Pickands, Mather & Company, Cleveland.

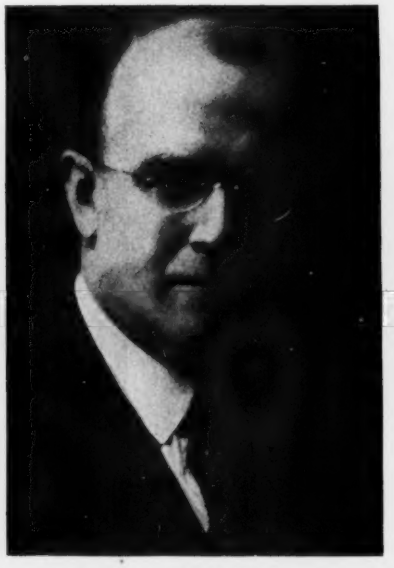
The directors were nominated by the following committee: A. G. Mackenzie, of Salt Lake City, secretary of the Utah Chapter of the American Mining Congress; E. W. Parker, of Philadelphia,

director, Anthracite Bureau of Information; and V. P. Geffine, of The Cleveland-Cliffs Iron Company, of Cleveland.

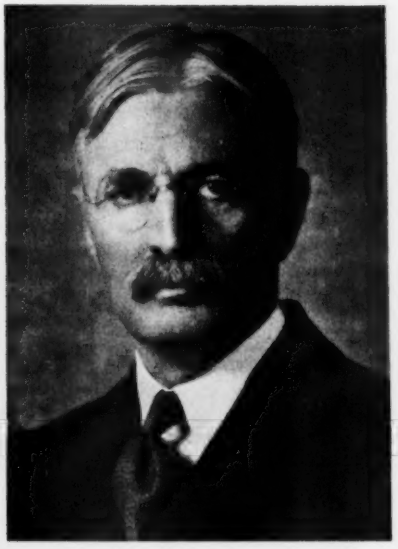
In his annual report Robert E. Tally, of New York, president during the past two years, said the American Mining Congress had had remarkable success under the direction of its executive secretary, J. F. Callbreath. "The work it is doing is important and can not be curtailed," said Mr. Tally. "There is necessity for stabilization of adjustment of supply to demand in the mining industry and collective curtailment. An obstacle in the way of such curtailment is in the anti-trust laws. There is a movement on foot to have these laws modified and to place a different interpretation on their application. President Hoover, in his message to Congress, paved the way for Congress to take up the matter. The American Mining Congress has been working on the matter through a stabilization committee, which held several meetings in New York, representing the iron, zinc, lead, copper and coal industries. The American Mining Congress is unable to do anything on this matter

DIRECTORS, THE AMERI

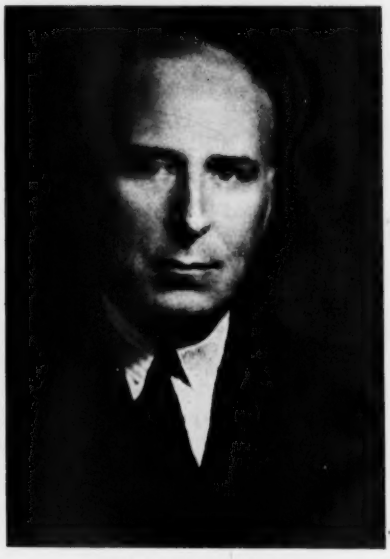
A. E. BENDELARI,
First Vice President



JESSE B. WARRINER,
Second Vice President



CLINTON H. CRANE



STANLY A. EASTON

JAMES T. SKELLY,
Third Vice President

W. J. JENKINS

J. B. PUTNAM,
Of Pickands, Mather & Company, was also elected Director of The American Mining Congress. No photograph available

DIRECTORS, THE AMERICAN MINING CONGRESS

CAN MINING CONGRESS

ROBERT E. TALLY,
Retiring President

C. J. RAMSBURG

LOUIS S. CATES

unless instructed by the industries. Now is the time to have something done. The matter is to be presented to these respective industries, who are to report to the American Mining Congress for action they may desire."

The mine tax conference adopted the following resolution:

"*Resolved*, That it is the judgment of this meeting, representing a large majority of the mining industry, that present United States revenue laws governing depletion of mines should not be disturbed, except that some amendment to the provisions relative to discovery should be made so as to avoid as far as possible discrimination regarding which complaints are now made, and that a committee be appointed by the chairman to prepare and take such action as they deem advisable to further such amendment; and be it further

Resolved, That if provision for percentage depletion is adopted it should be at a rate of not less than 33 1/3 percent of net income before depletion, and should in no event be less than depletion under existing law.

"The committee is empowered to represent the American Mining Congress before the Joint Congressional Committee on Internal Revenue Taxation and take such further action as may be found fit to carry out the intent of the above resolution."

The committee appointed consisted of Paul Armitage, of New York, chairman of the National Tax Committee of the American Mining Congress; A. P. Ramstedt, of the Hercules Mining Company, of Wallace, Idaho; R. C. Allen, of Oglebay, Norton and Company, of Cleveland; A. G. Mackenzie, secretary of the Utah Chapter of the American Mining Congress, Salt Lake City; A. Scott Thompson, of Miami, Okla.; J. D. Zook, of Chicago, president and commissioner of the Illinois Coal Operators' Labor Association; and H. B. Fernald, of Loomis, Suffern and Fernald, of New York.

Tax Conference

A large number of tax experts in the mining industry, including members of the General Tax Committee of the American Mining Congress, and others attending the conference, were present at the tax conference presided over by Paul Armitage, of New York, chairman of the General Tax Committee. The conference considered the depletion question, discussing the arbitrary fixing of regional rates, the meaning of "equitable apportionment" of depletion deduction between lessor and lessee; a periodical revaluation for depletion purposes and recommendations to be made on depletion at a hearing to be held on the subject by the joint committee.

"Taxation is the taking from the taxpayers of the smallest amount that will suffice to carry on the Government for the public good, based on equitable distribution, certainly in incidence and ability to pay," said Representative Hawley.

"I do not subscribe to the theory that taxation is 'the art of getting the most feathers from the goose with the least squawking,'" said Mr. Hawley.

In discussing the activities of the joint committee, Mr. Hawley said a preliminary report of its staff indicates that the equity of the present mine depletion system is doubtful, and that the committee will study methods which give some promise of securing a better distribution of depletion with greater simplicity.

The purpose of depreciation studies being conducted by the Internal Revenue Bureau was outlined by Mr. Keenan, valuation engineer of the bureau. "The sole desire of the bureau in conducting the depreciation study was to be helpful, to lessen the taxpaper's burden," he said. Mr. Keenan stated that, when the bureau initiated the study of depreciation, it was desired to obtain all the data relative to that subject that the industries of the country might submit, that they might be given an opportunity to present fully and clearly their views and their recommendations on depreciation rates, the effect of obsolescence, the method of charging replacement costs and other accounting practices, so that the bureau and taxpayers might be better informed concerning depreciation accounting to the end that the cost of plant and equipment used in doing each year's business might be determined with a fair degree of accuracy. "In a great number of cases more attention to depreciation accounting is desirable and from the standpoint of sound finance is necessary," he said.

Depreciation Studies

"The revenue agent who works in your office today, auditing your return for the current year, and checking the computation of your deduction on account of depreciation on mining machinery and other equipment, may tomorrow be working on the return of a shoe manufacturer. In the course of his work he is

called upon to consider the depreciation deductions of every conceivable kind of industrial plants, and unless he is familiar with the particular industry and the factors that enter into a determination of allowable depreciation for that industry, it is possible that erroneous conclusions may be drawn.

"The bureau believes that its employes should be as fully informed as possible. Where they are determining depreciation deductions in an industry with which they are not fully familiar, they should have a guide in addition to the experience in a limited number of cases which have come under their observation. In addition, there are a great number of taxpayers who desire information as to the probable useful lives of their assets for reasons wholly unrelated to the field of taxation. The depreciation studies which have been made will in some measure supply these needs. A preliminary report on these studies will be made shortly. The rates of depreciation, based on the probable useful lives set forth, will not be prescribed in any case, and employes of the bureau, as well as taxpayers, will be cautioned against using them arbitrarily. Any use that they may have will be solely as a guide or starting point from which the correct rates in any case may be predicated according to the facts and conditions peculiar to that case."

A. P. Ramstedt, of the Hercules Mining Company, of Wallace, Idaho, favored a depletion allowance of 33 1/3 percent of the operating profit after depreciation, in place of the present discovery depletion provision. The percentage allowance should not be less than if the depletion allowance was computed on the March 1, 1913, value or the cost of the mine. Mr. Tally and Mr. Callbreath expressed the desire of that organization to secure adequate depletion allowances for all branches of the mining industry which it serves. Mr. Tally stated that the tax question, and particularly the depletion factor, was the most important subject before the mining industry, and Mr. Callbreath spoke of the importance of presenting to Congress the united views of the mining industry on the depletion question. R. C. Allen, of Oglebay, Norton & Company, of Cleveland, and J. D. Zook, president of the Illinois Coal Operators' Labor Association, spoke of the importance of definite agreement by the metal and coal industries on the depletion question. The economic soundness of mine depletion was pointed out by Dr. L. C. Graton, of Harvard University, a former official of the Internal Revenue Bureau. He favored the percentage method of depletion allowances on the ground that it corrected automatically any errors which might develop as to the life of the mine, products extracted and other factors. "To reach a depletion percentage for all taxpayers an arbitrary rate must be assumed covering a wide variety of operations," said Dr. Graton. Eugene McAuliffe, Union Pacific Coal Company, of Omaha, also spoke in favor of depletion allowances.

H. B. Fernald, of New York, spoke on inconsistencies in the Federal income tax laws and their administration.

Mine Mechanization

At the mechanization conference consideration was given to the general object of mechanization, which was described as being along the same lines which are followed by other industries in order to enable the coal-mining industry to keep pace with developments in other industries. Reference was made to the continued growth of machine installations, increased safety to miners by reason of mechanical operations, better working conditions in the mines, prevention of duplication of experimental work and general methods of gathering statistics on machine installations for exchange between companies. The conference was presided over by Dr. L. E. Young, of the Pittsburgh Coal Company, chairman of the National Committee on Mechanized Mining of the American Mining Congress. The conference was attended by a large number of representatives of mining and manufacturing companies and considered the following subjects:

Economics of Mechanical Mining—When is it profitable to install mechanization? To what extent do wage scales, class of labor, physical conditions of the seam, or market requirements limit or control the economy of machine over hand methods? What is the economic value of the indirect savings due to higher class of labor, higher rate of production, etc.?

Cost of Mechanizing—In comparing the equipment cost for hand and machine loading what items should be charged and what items should be credited to a machine installation? Utilization of present equipment with new methods—How does the cost of adapting a hand-operated mine and its equipment to a machine installation compare with the cost of developing and equipping an entirely new operation?

Selection and Training of Management—What methods should be recommended to encourage the supervisory staff to adopt progressive ideas, to originate new methods and to discard old practices? What is the value of personnel training for supervision and labor?

Surplus Labor—How shall labor which is released by the adoption of machine methods be handled?

Committee Activities for 1931—Character of material to be gathered and exchanged; safety statistics; accounting methods; publicity.

At noon a luncheon was held for the Mechanization Division and delegates.

At the meeting of the Board of Governors of the Southern Division of the American Mining Congress, Louisville was selected as the city in which to hold the Sixth Annual Industrial Development Conference, March 16 to 19. Capt. R. M. Watt, of Pineville, Ky., a member of the Kentucky Progress Commission, will be in charge of the program as chairman of the Board of Governors.

Standards Conferences

Six standardization meetings were held during the conferences on safety rules for installing and using electrical equipment in metal mines and safety code for underground transportation in coal mines. Meetings of the Committee on Locomotives for Coal Mines, Coal Mine Tracks and Coal Mine Drainage Committees were also held, as well as a general conference on new projects. The two proposed new projects under consideration were coal mine fire fighting and prevention and coal mine cars. It was stated at the conference that the committee on safety rules for installing and using electrical equipment in metal mining, under the chairmanship of F. L. Stone, industrial engineer of the General Electric Company, has for three years been engaged in the study and preparation of rules for safeguarding the use of electricity under ground with the following points in mind: (1) Remove the contributory causes of accidents or danger. (2) Remove from the vicinity of electrical apparatus all elements susceptible to the influence of electricity. (3) Keep the electric current where its belongs if possible; if not, limit the area of its activity by protective devices. (4) Use a large factor of safety in the selection, installation and inspection of equipment. (5) Have full control of the operation of electrically driven machines. The work of the committee was reported as practically completed and received at the conference. Comment and suggestions from many of the members looking toward the preparation of final draft were considered.

It was stated that recommendations of the committee on a safety code for underground transportation in coal mines have gone into four drafts during the course of their preparation. The conference agreed on final recommendations and sent the report to the balance of the committee for ratification.

Safety Rules

The safety rules agreed upon will materially decrease the possibility of ac-

cidents under ground through the proper safeguarding and installation of moving equipment, and also through the general adoption and use of proper methods of handling such equipment. The committee is representative of the American Association for Labor Legislation, American Institute of Mining and Metallurgical Engineers, Coal Mining Institute of America, Mine Inspectors' Institute of America, National Coal Association, National Electrical Manufacturers' Association, National Safety Council, Rocky Mountain Coal Mining Institute, U. S. Bureau of Mines, and U. S. Department of Labor, besides the American Mining Congress, the sponsor which is represented by the chairman, Fred Norman, chief engineer, Allegheny River Coal Mining Company, and C. E. Watts, mechanical engineer, Berwind-White Coal Mining Company.

The conference also considered standards for locomotives for coal mines, a new project. R. L. Kingsland, general superintendent of the P. and M. Department of the Consolidation Coal Company, is chairman of the Committee of the American Mining Congress, which is considering this project. The conference was told that it is proposed to standardize the design and details of construction of coal mine locomotives and methods for their safe and efficient operation. The types of equipment that may come under the procedure of this committee are trolley, storage battery, cable reel and combinations of these types.

The American Mining Congress in 1927 completed a national standard for coal mine tracks and a sectional committee is engaged in revising and expanding this standard. Details of frog and switch construction, spikes, plates, guard rails, and other items of track construction are under consideration, in addition to proper methods of track construction, including ballasting, tie spacings, signal systems, etc. This committee is under the chairmanship of F. C. Hohn, superintendent of transportation of the Pine Hill Coal Company, and the detail committee on frogs is under the chairmanship of R. L. Ireland, vice president, Hanna Coal Company.

The conference was advised that the coal mine drainage sectional committee has practically completed the revision of the tentative American standard approved in 1926. The revised standard includes recommendations on field pumps, permanent pumps, piping for pumps, operation of pumps, including automatic and semi-automatic installations, priming pumps, safety provisions, etc. Storage of mine water, natural drainage, unwatering abandoned workings, mine water and its action upon mine drainage equipment and acid-resisting metals. The following associations are represented on this committee: American Institute of Mining and Metallurgical Engineers, American Society of Civil Engineers, American Society of Mechanical Engineers, Coal Mining Institute of American Hydraulic Society, American Mine Inspectors' Institute of America, National Coal Association, U. S. Bureau of Mines, and the American Mining Congress, the sponsor organization. The chairman of the committee is Walter E. Housman, research engineer of the H. C. Frick Coke Corporation, Scottdale, Pa. The conference considered and recommend for favorable action by the committee all but one of the objections that have been raised to the standard.

New Projects

At a general conference on new projects Newell G. Alford, of Eavenson, Alford and Hicks, consulting engineers of Pittsburgh, presided. This conference considered proposals of two new standard projects, coal mine fire fighting and prevention and mine cars. The first is of particular interest at this time, due to the fact that public attention has, during recent months, been brought to focus on several very disastrous explosions and fires. There is in existence a national standard covering the proper rock dusting of mines to prevent coal dust gas explosions, and in addition there are the safety and rescue courses taught by the Bureau of Mines. No nationally recognized recommendations have, however, been adopted which cover approved methods of fire prevention in general and proper methods and equipment to be used in the fighting of the fires themselves. The conference developed the experience and practice of all the companies represented by delegates looking toward the organization of a representative committee to develop the project. The initiation of the project was indorsed immediately.

Regarding mine cars, the delegates at the conference said there is probably no other item of underground mining equipment manufactured in such wide and wasteful variety than the mine car. Due to the varied conditions of mine underground, it has long been felt that standardization of cars was impossible. It is now becoming more generally recognized that all of the elements of car construction, such as wheels, bearings, bumpers, draw bars, sheet steel, etc., are susceptible to standardization.

Unquestionably such standards would effect wide saving to both the manufacturer of the cars and the mine operator who has huge investments tied up in rolling stock. The American Mining Congress estimates that over $200,000,000 is invested in the coal-mining cars in the United States today. After discussion the conference recommended that the project be undertaken and that it attempt to cover details of mine car parts only.

A logging camp of the Land Department of The Cleveland-Cliffs Iron Company

Hidden Gas Springs

BY CARL SCHOLZ*

House where fire occurred and men were burned, due to escaping coal gas from the earth becoming impounded in the basement.

THE natural flow of gas and exudation of petroleum and asphaltic oils from the earth were known to the ancients on the Eastern Hemisphere over a thousand years before the Christian era, according to history. On the Western Continent the same phenomena were known to the Indians long before the arrival of the white settlers, and we find records of several "Burning Springs" in West Virginia and Kentucky. George Washington visited the "Oyle" springs burning a few miles east of Charleston, W. Va., in 1775 to verify the rumors he had heard regarding this so-called miracle. Three burning springs on the banks of the Tug River had become the meeting place for the wagon trains of the early pioneers.

These surface indications were largely responsible for the early drilling and prospecting, which later brought about the development of the petroleum, gas and salt industries on the western slope of the Appalachian Range, which are now of great importance and value.

Petroleum springs are easily discovered on dry land, where the oil oozes out under water; a few drops will spread over a large surface and enable the prospector to trace the source. Gas Springs are not so readily found, unless the flow is strong enough to maintain combustion; forest fires were responsible for such ignitions and discovery. When gas escapes under water, it can be seen as bubbles rising to the surface.

The supply of gas wells may come from either of two sources: First, from the natural gas deposits lying at considerable depth and under pressure ranging from 500 to 1,000 pounds per square inch, where cavernous rocks or geological disturbances permit the gas to ascend and escape into the atmosphere. It has been usually believed that most springs come from this source. Second, the other source is the carboniferous rocks, shale and coal seams, lying relatively close to the surface and often above the water level of the erosions. From the writer's observations, made with the aid of a very sensitive and practical instrument, it appears that the majority of springs in this section come from the second source, and thus explain many mysterious fires and accidents not accounted for otherwise. Frequently both shale gas and natural gas occur in the same territory. Prospect drill holes for coal usually generate gas where high-grade coal is penetrated, and many shallow water wells have been closed in to utilize the gas thus found. The writer drilled a water well at Edwight, W. Va., and an artesian flow containing enough gas to heat the water for a wash house used by 200 men was encountered about 1,000 ft. above the natural gas sands.

Gas can be detected in mines with a safety lamp because the roof confines it and the darkness enables the observation of the gas cap on the burning wick. It is impossible to do so outdoors in daytime. In streams and water courses the gas bubbles can be observed, but there is no way to determine the quantity.

The description of an investigation made in connection with an accident, using the recently perfected methane indicating detector will prove of interest, because it seemingly is the first case on record:

During October, 1929, in a small mining town in the eastern Kentucky coal field an accident occurred in which two men were seriously burned by a fire in the basement of a building located on the slope between the highway and the water course about 15 ft. below. The house is built much better than usually found in similar surroundings. The basement walls are of concrete, extending some 3 ft. below the floor level into hard clay. There is a tongued and grooved floor and ceiling. The height is 7 ft. and there are several casement windows close to the ceiling. The basement floor is level with the ground on the back of the house, but the main floor is nearly level with the road passing in front. About 20 ft. from the rear of the building lies a low-pressure gas line 8 in. in diameter carrying 50 pounds pressure and buried 7 ft. below the surface. The soil is of the usual sandy drift and has been cultivated as a garden. Very little water flows in the creek, but the ground water rises 4 ft. above the gas line. The house has been vacant for about two weeks, and the new owner was moving in; several trips had been made into the basement in daylight hours with doors and windows open, and nothing unusual had been noticed and there was no odor of natural gas, with which the tenant was familiar, having always lived in the oil and gas fields. About 6 p. m. he made another trip into the basement to put something away in the storeroom located nearer the road, and when he could not find the switch of the electric drop light in the darkness he struck a match and a fire occurred, and both men were badly injured by the burning of their clothing. There was no damage to the house and not even the windows were blown out.

Immediately after the accident a local official of the gas company owning the pipe line came to see if he could be of assistance and tried to locate the cause of the accident by uncovering the gas pipe near the house, but with the exception of a very small hole 1/16 in. in diameter, about 30 ft. from where the fire started, found the pipe in good condition.

In due time, suit was brought against the owner of the pipe line for damages to the two injured men, and investigation was made as to the cause of the fire, because it seemed quite impossible for gas from the very small leak to find its way into the building in the absence

* Consulting Mining Engineer, Charleston, W. Va.

of a conductor, as gas will not travel latterly for 20 ft. under a loose soil cover and with the pipe 4 ft. below water, when the total distance to the surface was only 7 ft.

About 40 ft. below the surface of the basement floor lies a 5-ft. vein of high-grade coal, covered by a shale deposit 65 ft. thick, extending about 20 ft. above the creek level and capped by a massive sandstone. A mine is operating in this seam, but no coal had been removed from under the house. Other matters attracted attention. A diamond-drill hole one-fourth mile away, drilled to the same seam years ago, produced gas and was burning fiercely when the investigation was made. A water well near by had been closed in and the gas from it furnishes heat and cooking gas for a 10-room building. The water course passing through the valley shows a large number of bubbles, and it is only reasonable that if gas rises where there is water and it can be seen it rises on dry land but can not be seen. These observations were made some distance from the pipe line. Tests were made with the methane detector in the basement, outdoors by drilling 5-ft. holes over which the detector head was held and covered with an airproof cloth, and by passing the detector head over the ground in the open air. The results were most astonishing.

In the basement near the ceiling, with windows partly open, from .05 to 0.17 percent methane was found. In 12 drill holes three produced over 7 percent and were lighted to check the instrument. In six holes from .3 to 3 percent was indicated, and three holes showed very little or no gas. In passing along the bottom and the road .05 to .10 percent was observed in the open air, with the detector head about 12 in. above the ground, though this condition was only observed within a distance of 500 ft. of the house. The shale outcrop under the sandstone cover 4 ft. above creek level showed 2 percent of gas.

A week later these readings were checked, but while the results in the basement were the same, the drill hole results varied greatly. No observations were made of the barometric conditions on either test. With these facts before us, there is no doubt but what shale gas had accumulated in the building and not gas from the pipe line, and this gas can be found there today. No doubt that gas had been there before, but there was no spark to set it off. It is only when gas is there and a spark sets it off that mischief occurs.

It may be interesting to note that the percentage of gas discovered in the basement (.17 percent) is more than one-half of the limit specified by the Mine Inspection Department for classifying a gaseous mine. If .25 percent of gas is found in the ventilating current of a mine, inclosed motors and electric cap lamps must be used.

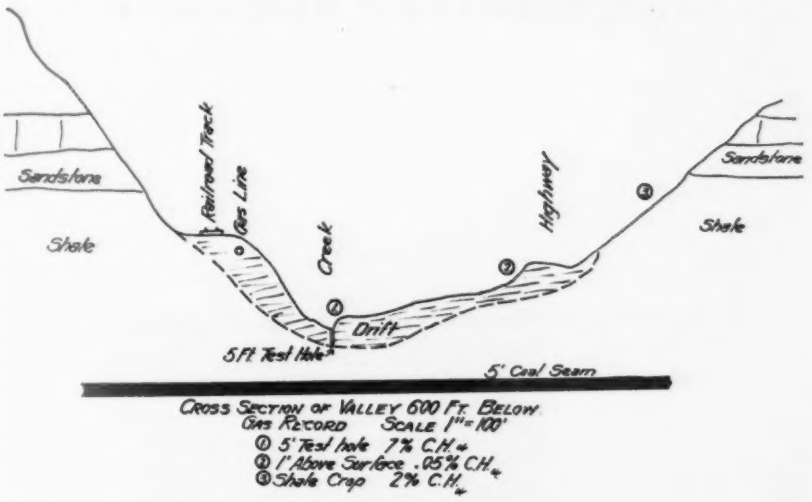


FIGURE 1
This cross section is 600 ft. east of cross section No. 2

The method of determining gas in mines is by the use of safety lamps, which indicate as little as 1¼ percent; if lower readings are required, analysis has to be resorted to. It may be interesting to describe the gas-testing apparatus used in the above investigation. The instrument is manufactured by the Union Carbide Company and has received the approval of the U. S. Bureau of Mines. It consists of a detector head, a meter case and a portable storage battery, to which is connected a cap lamp. The working principle of the detector utilizes the effect of combustion of methane and air mixtures on the surface of a glowing non-catalytic filament. This combustion increases the temperature and consequently the electrical resistance of the filament. The change in resistance causes the needle of the meter to move over a scale, calibrated in percent of methane, and the reading, therefore, is the actual percentage of methane present in the air at the place being tested. The meter scale is graduated zero to 7 percent with .1 subdivisions.

By using this detector it may be possible to locate commercial deposits of natural or shale gas, because of the ease with which small leakages or seepage of gas may be found on the surface.

No doubt this constant escape has some effect in the alteration of coal seams, but the extent may be very trivial.

The writer would appreciate advice as to whether similar observations have been made by any other means, and if these observations had any commercial significance.

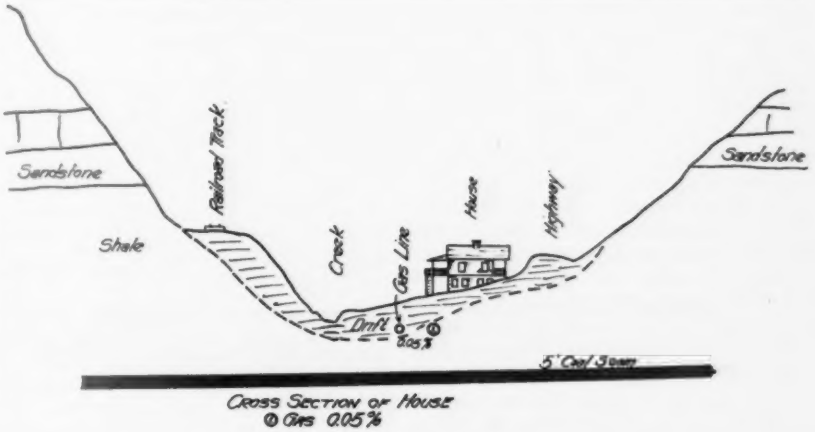


FIGURE 2

Legislative Review

CONGRESS resumed its activities on December 1 with a large assortment of old and new legislative proposals for consideration during a short session which will terminate on March 4 next. Even before the session got well under way there were demands from certain sources for an extra session of Congress next spring. This insistence came from progressive Senators, Norris, of Nebraska; Shipstead, of Minnesota; and Brookhart, of Iowa, who said they would force an extra session unless Congress at the present session passes on the Muscle Shoals and anti-injunction bills. The Conference Committee of the House and Senate has been unable to agree on the Muscle Shoals bill and the Senate Steering Committee has declined to give a preferred place on the legislative program for the anti-injunction bill on the ground that such status should not be accorded measures such as this before the Senate on adverse committee reports. Senator Lewis, of Illinois, who will take office March 4, favors an extra session, while such an extra session is opposed by Senator Robinson, of Arkansas, and others.

Hope of a continuance of the 1 percent tax reduction allowed individuals and corporations on 1930 income tax returns was abandoned on reports by the President that the condition of the Federal Treasury would not permit of this reduction on 1931 tax returns. Senator Borah, of Idaho, has suggested a 2 percent tax increase to meet an anticipated Government deficit but this has been opposed by Representative Hawley, of Oregon, and others handling tax legislation. A suggestion that the excess profits tax be restored has been received from the Common Council, of Buffalo, N. Y.

Hearings were held for four days early in December on proposed percentage depletion for mines before the Joint Congressional Committee on Internal Revenue Taxation, but because of a division of sentiment among the mining industry and opposition from the Treasury Department, no action is looked for at this session.

President Hoover in his message to Congress suggested investigation of the capital gain provision in the tax law, and Senator Reed, of Pennsylvania, suggested repeal of this provision. Senator Reed says the allowances for capital losses this year will amount to $160,000,000.

Investigation by Congress as to the feasibility of modifying the anti trust law to relieve industries, such as the bituminous and other national resource industries of destructive competition was also suggested by the President. Investigations of this subject, with particular reference to preventing monopoly, were proposed in resolutions by Senators McKellar, of Tennessee, and King, of Utah.

Restoration of the 1922 tariff law in place of the law recently enacted was favored by Representative Crisp, of Georgia, in a House bill, while a duty of 5 cents per pound on copper was suggested by the Association of Commerce of Houghton, Mich. A duty on copper was also favored by nearly 3,000 citizens of Arizona.

Because of the depressed economic situation and consequent unemployment bills were introduced in the House and Senate for a suspension of all immigration from foreign countries for from 2 to 10 years and the House Immigration Committee reported a two-year suspension bill. Senator Couzens, of Michigan, thought treaty provisions would prevent restriction of immigration from Canada.

A number of bills were introduced to levy a duty on imported oil and for the regulation of gas pipe line companies.

The month marked the death of two Congressmen—Representative Quayle, of New York, and Senator Overman, of North Carolina. The latter will be succeeded by former Governor Cameron Morrison, of Charlotte, by appointment of the Governor, to serve until the election in 1932.

Committee Assignments

Incoming members at the present session brought about a number of committee changes. New Senators were named on committees as follows: Labor, Morrow, of New Jersey, and Williamson, of Kentucky; Banking and Manufactures, Bulkley, of Ohio, and Davis, of Pennsylvania; Banking, Carey, of Wyoming.

To make way for new members, Representatives resigned from House Committees as follows: Hare, of South Carolina, from Mines and Mining; Manlove, of Missouri, from Labor; Howard, of Nebraska, from Public Lands; and Patman, of Texas, from Coinage. New members were assigned to committees as follows: Parsons, of Illinois, and Loofbourow, of Utah, Mines and Mining; James, of North Carolina, Public Lands; Dorsey, of Kentucky, Coinage; Reilly, of Wisconsin, Banking; and Rich, of Pennsylvania, Patents.

A number of important bills affecting the mining industry have been presented to Congress. These include measures to perfect titles to oil shale land claims; to suspend the annual assessment requirement on mining claims until 1932; to forbid the use for other than mining purposes of mining locations in national forests; to transfer the Bureau of Mines, Geological Survey and General Land Office to Salt Lake City; to establish a building at Salt Lake City for use of the field services of the Government affecting mining; to establish an experiment station of the Bureau of Mines at College Park, Md.; and authorizing prospecting permits and leases for gilsonite and other like substances.

The usual fight developed over the western assay office. The House voted to abolish the assay offices at Carson City, Nev.; Salt Lake City, Utah; Boise, Idaho; and Helena, Mont., but the Senate restored these offices in the Treasury appropriation bill on amendments by Senators Oddie, of Nevada; Smoot, of Utah; Thomas, of Idaho; and Walsh, of Montana.

The following is a summary of bills introduced during the month:

H. R. 15130. Mr. Colton (Rep., Utah). This bill provides for the forfeiture of oil shale land claims unless the $100

worth of annual assessment work shall have been performed by noon July 1, 1931, and each succeeding year. No patent for oil shale mining locations shall be issued unless application therefore has been filed in the land district where located prior to June 30, 1934. Public Lands.

H. R. 15131. Mr. Colton (Rep., Utah). This bill provides that failure to perform the annual labor or improvements shall constitute an abandonment of oil shale land claims and their forfeiture by the Interior Department. Public Lands.

H. R. 15132. Mr. Colton (Rep., Utah). This bill prescribes that the annual assessment work on oil shale claims shall be solely a question between the applicant for patent and any citizen claiming an adverse right to the mineral land, and that no lack or omission thereof shall be the basis of contest or adverse proceeding heretofore or hereafter commenced against the claims by the Government. Public Lands.

H. R. 15002. Mr. Eaton (Rep., Colo.). This bill provides that claims to oil shale lands shall be considered to be abandoned unless claimants file claims at local land-offices by August 25, 1932. It also provides that claimants shall file with such offices before August 25, 1931, a statement of the claim and work done upon it, and that thereafter $100 shall be paid annually to the Government on the claim in place of $100 worth of annual labor, beginning June 30, 1932. Public Lands.

Mine Assessments

S. 5211. Mr. Smoot (Rep., Utah). This bill proposes to suspend the annual assessment work required on mining claims during the years ending July 1, 1931 and 1932. Mines and Mining.

H. R. 14448. Mr. Swing (Rep., Calif.). This bill would prohibit the use of unpatented mining locations in national forests for other than mining purposes. Mines and Mining.

S. 4788. Mr. King (Dem., Utah). This bill would transfer the Bureau of Mines from the Department of Commerce to the Interior Department, under whose jurisdiction it formerly lodged, and locate it at Salt Lake City, Utah, together with the Geological Survey, General Land Office, Reclamation Service, Indian Bureau, and National Park Service, as a branch of the Interior Department under an assistant secretary. The bill proposes that the transfer shall be effective January 1, 1932, and appropriates $1,000,000. Public Lands.

S. 5210. Mr. Smoot (Rep., Utah). This measures provides $1,000,000 for a Federal mineral industry building at Salt Lake City, Utah, on land to be donated by the city, for use of the field services of the Bureau of Mines, Geological Survey, Mint Bureau, Census Bureau, Foreign and Domestic Commerce Bureau and other Government offices whose activities relate to the mining industry. Mines and Mining.

S. 5220. Mr. Tydings (Dem., Md.) and Mr. Goldsborough (Rep., Md.). This bill proposes to appropriate $350,000 for an experiment station of the Bureau of Mines at College Park, Md., on land to be donated by the University of Maryland. Mines and Mining.

H. R. 14248. Mr. Colton (Rep., Utah). This measure would authorize prospecting permits and leases for asphalt, gilsonite, elaterite and other like substances on the public domain. Public Lands.

H. J. Res. 433. Mr. Hawley (Rep., Ore.). This bill would authorize corporations to deduct from gross income amounts contributed for charitable, social-welfare or unemployment relief purposes from July 1, 1930, to June 30, 1931, such deductions, however, not to exceed 15 percent of their net income. This legislation is recommended by the Treasury Department. Ways and Means.

Anti-trust Inquiry

S. Res. 358. Mr. McKellar (Dem., Tenn.). This resolution proposes an investigation by the Senate Judiciary Committee as to operation of the anti-trust law. The resolution provides as follows:

WHEREAS the conditions of depression and unemployment in the United States are generally believed to be in a considerable measure due to the combinations, mergers, chain organizations, interlocking directorates, holding companies, price or cost fixing associations, financial foundation associations, and uniform controls of business, banking, manufacturing, and commercial corporations of almost every kind and description; and

WHEREAS it is desirable not only to carry out the President's recommendations but to have an investigation of the operation and enforcement of the anti-trust laws generally; and

WHEREAS it is the opinion of many that very numerous organizations, price or cost fixing associations, combinations, mergers, chain organizations, interlocking directorates, holding companies, financial foundation associations, and uniform controls are in violation of the Sherman anti-trust laws and the Clayton anti-trust laws: Now, therefore, be it

Resolved, That the Committee on Judiciary is authorized and directed to hold hearings and to investigate and report to the Senate at the earliest practicable moment—

First. Whether or not the "interpretation of the anti-trust laws by the courts, the changes in business, especially in the economic effects upon these enterprises closely related to the use of the natural resources of the country" require a change in said anti-trust laws.

Second. Whether or not the Sherman anti-trust laws and the Clayton anti-trust laws, and any other anti-trust law on the Federal statute books are being violated, and if they are being violated to what extent is the Department of Justice prosecuting the same; whether or not they are prosecuting some violators and not prosecuting other violators; whether they are compromising or adjusting and making terms with some violators by consent court decrees, opinions or otherwise; and if some violators are not being prosecuted by the department why the same are not being prosecuted.

Third. Whether or not in any cases brought by the Government against alleged trusts, orders, or decrees have been agreed upon by the Department of Justice permitting such illegal combinations to continue when claimed to be used only for the purpose of creating credit protection; and the committee will return as full a list of such cases as possible and report all information concerning such cases in which said laws have been modified by consent decrees if such has been done.

Fourth. Whether or not the Department of Justice has rendered any opinion, written or verbal, expressed or implied, to any illegal price or cost fixing association, gentlemen's-agreement association, credit-protection association, or any other organization having similar purposes; that the proposed acts of such associations would or would not constitute a violation of the anti-trust laws and the committee will report all the pertinent facts relative thereto.

Fifth. Whether or not there is now in existence any understanding or agreement between said associations or any of them and the Department of Justice relative to the enforcement by the said department, or partial enforcement by the said Department of Justice of the anti-trust laws of the United States.

Sixth. Whether or not the existence of any such combinations, mergers, chain organizations, interlocking directorates, price or cost fixing associations, financial foundation associations, holding companies, chain banks, or uniform controls or combinations, if any such are found, have interfered with or are now interfering with or stifling free competition or are bringing about monopoly.

Seventh. The committee, after making such investigation and reporting its findings of fact and its conclusions, will make such recommendations as it may deem fit and proper looking to the repeal, in whole or in part, of said anti-trust laws as recommended by the President or the retention of such laws or the strengthening of such laws, and especially as to the strict enforcement of such laws. Judiciary.

S. Res. 354. Mr. King (Dem., Utah). This is similar to the foregoing and provides as follows: That the Committee on Judiciary is authorized to conduct a thorough investigation for the purpose of determining whether it is desirable or necessary (a) to strengthen and extend the provisions of the anti-trust laws or (b) to modify any of the provisions of such laws. The committee shall report to the Senate as soon as practicable the results of its investigation, together with its recommendations, if any, for necessary legislation.

Oil Duty

H. R. 14814. Mr. Sproul (Rep., Kans.). This bill proposes import duties on oil as follows: crude petroleum, $1.25 per barrel; fuel oil, 50 cents per barrel;

refined products, 50 percent ad valorem. Ways and Means.

H. R. 13563. Mr. Williams (Dem., Tex.). This bill proposes duties of $1 per barrel on crude petroleum and fuel oil and 50 percent ad valorem on refined products. Ways and Means.

S. 5030. Mr. Capper (Rep., Kans.). This bill would create a Federal gas pipe line commission of three members to be appointed by the President, to supervise the purchase, production, distribution, sale and transportation of natural or artificial gas by pipe line agencies. Newly established companies would have to secure a permit from the commission. Interstate Commerce.

S. 4904. Mr. Reed (Rep., Pa.); and H. R. 14045. Mr. James (Rep., Mich.). These bills would authorize the War Department to grants rights of way across lands under control of the War Department for oil and gasoline pipe lines, as recommended by the department. Military Affairs.

S. J. Res. 211. Mr. McNary (Rep., Oreg.). This resolution proposes a $60,000,000 loan to farmers in drought or storm stricken areas, for the purchase of food, seed, fertilizers, food for livestock and fuel and oil for tractors used in crop production. Passed by the Senate.

H. R. 14920. Mr. McSwain (Dem., S. C.). This bill would authorize the lease of the Muscle Shoals, Ala., nitrate and power project by a board of three members to be named by the President. Among other things for which the project would be leased would be the manufacture of electro chemicals and ferro-alloys. Military Affairs.

H. R. 13513. Mr. Crisp (Dem., Ga.). This bill proposes to replace the 1930 tariff law with the rates of the 1922 act. Ways and Means.

S. 4848. Mr. Oddie (Rep., Nev.). This bill would prohibit the importation of any merchandise from Russia. It is aimed particularly at manganese ore and coal and was published in our December issue. Finance.

S. 5094. Mr. McNary (Rep., Oreg.). This bill would forbid the importation after April 1 next of goods mined or produced by convict, forced or indentured labor. Finance.

Helium Use

H. R. 14447. Mr. Parker (Rep., N. Y.). This bill proposes to encourage the development of merchant airship lines in the foreign trade. Referring to the availability of helium for such ships, Mr. Parker says:

"In developing our foreign trade by means of airships, the United States has one outstanding advantage over all other nations. This advantage lies in its helium supply. No other nation boasts any supply of this gas, while our supply is apparently unlimited. It is found in substantial quantities in several of the western states, including Kansas, Oklahoma, Texas, Utah, and Colorado. With this natural advantage this country would be at fault should it fail, through the lack of proper legislation, to give our foreign trade the benefit of the safety, speed and capacity of helium sustained airships." Interstate Commerce.

S. 5078. Mr. McNary (Rep., Oreg.). This is similar to the foregoing. As to helium resources for these air lines, Mr. McNary says:

"The fact that the United States has the only helium supply in the world large enough to permit of the operation of airships using helium, and that this supply is apparently unlimited, makes it highly desirable that this country should assume the leadership in developing this new vehicle of transportation, and in establishing upon a firm basis the new industries necessary to meet its requirements. Helium has already been found in substantial quantities in the States of Texas, Oklahoma, Kansas, Colorado, and Utah." Commerce.

H. R. 14564. Mr. Mansfield (Dem., Tex.). This bill proposes a $500,000,000 bond issue for river and harbor improvements, including connecting channels of the Great Lakes. Ways and Means.

S. 5082. Mr. Shipstead (F. L., Minn.). This is similar to the foregoing. Commerce.

H. R. 14075. Mr. Denison (Rep., Ill.). This bill provides for the inspection by the Federal Steamboat Inspection Service of vessels navigating the waters of the Canal Zone. Interstate Commerce.

S. 5044. Mr. Walsh (Dem., Mass.). This bill appropriates $20,000,000 for deepening, widening and improving the Cape Cod Canal in Massachusetts. Commerce.

H. J. Res. 408. Mr. Knutson (Rep., Minn.). This resolution calls on the Interstate Commerce Commission to investigate and report as to whether coastwise traffic should be regulated by it. Interstate Commerce.

H. R. 14454. Mr. Celler (Dem., N. Y.). This bill proposes to create a World Commerce Corporation to improve commerce. It would be authorized to control reserves of natural resources that will supply ships with return cargoes and stabilize prices of raw materials, which American industries must obtain from abroad, and to maintain fuel stations. Judiciary.

S. 5005. Mr. Bingham (Rep., Conn.). This bill would require the purchase for military or naval purposes of domestic products. Military Affairs.

H. J. Res. 412. Mr. Connery (Dem., Mass.); H. J. Res. 414. Mr. Evans (Dem., Mont.); and S. J. Res. 214. Mr. Couzens (Rep., Mich.). These resolutions provide that resident laborers shall be employed at the highest prevailing rate of wages under public contracts. Labor.

S. 5020. Mr. Davis (Rep., Pa.) and H. R. 14272. Mr. Kelly (Rep., Pa.). These bills empower the Government to write into contracts on public works the compensation to be paid laborers and mechanics employed by contractors. The compensation is to be determined by a wage determination board consisting of one representative each of the Labor, Treasury, War, Navy, and Interior Departments, and two each representing private construction employers and employes, to be named by the President for four-year terms, the Secretary of Labor to be chairman. Labor.

H. R. 14458 and 15266. Mr. LaGuardia (Rep., N. Y.). These bills would forbid the issuance by courts of injunctions in labor disputes. Judiciary.

Industrial Commission

H. R. 13567. Mr. Ludlow (Dem., Ind.), and S. 4839. Mr. Blaine (Rep., Wis.). These bills propose to create a Federal Industrial Commission of five members to stabilize employment and bring about a saving wage and reasonable dividends. Judiciary.

S. 5026 and 5027. Mr. Norris (Rep., Nebr.). These bills would authorize the Federal Trade Commission to conduct investigations upon direction of the President, or of either House of Congress or under the act creating the commission. Interstate Commerce.

H. R. 14061 and 14081. Mr. Sumners (Dem., Tex.). These bills would authorize two or more states to enter into agreements with reference to the development and preservation of their natural resources. Agriculture.

S. J. Res. 207. Mr. Reed (Rep., Pa.). This resolution proposes to suspend immigration into the United States until July 1, 1933. Immigration.

Senator Harris (Dem., Ga.), introduced an amendment to suspend immigration until July 1, 1936. Immigration.

H. J. Res. 439. Mr. Johnson (Rep., Wash.). This bill proposes to suspend immigration until July 1, 1933. Reported by the Immigration Committee.

H. J. Res. 410. Mr. Johnson (Rep., Wash.). This bill proposes to suspend immigration until July 1, 1936. Immigration.

H. R. 15075. Mr. Blanton (Dem., Tex.). This is similar to the foregoing. Immigration.

H. J. Res. 427. Mr. Garber (Rep., Okla.). This resolution proposes to suspend immigration until July 1, 1941. Immigration.

H. R. 13554. Mr. McClintic (Dem., Okla.). This is similar to the foregoing. Immigration.

H. R. 14037. (*Continued on page* 45)

A SURVEY of MECHANIZED MINING for 1930

By G. B. Southward

THE figures showing several classifications of the different types of mechanized loading, which are submitted in the accompanying tables, were taken from a census made through the National Committee on Mechanized Mining. The coal companies whose operations are reported by these figures cover all of the important coal producing fields of the United States and, while it is not possible to include every mine which has loading equipment, it is reasonably certain that this list is sufficiently comprehensive to represent correctly the developments which mechanized loading is now following.

In the early part of 1929 a similar survey was made, and the results were presented at the 1930 Cincinnati convention and were later published in the June issue of THE MINING CONGRESS JOURNAL. A comparison between the figures of this present report and the one prepared earlier in the year indicates that considerable increase has been made both in the number of mines using mechanized loading and in the number of loading units installed. However, it should be understood that the increased coal tonnage produced by mechanized loading in the United States may not be in exact proportion to the increases shown in the number of mines or the number of equipment units. The present survey is more complete than the one compiled earlier in the year, and includes mines which were actually in operation when the previous list was made, but were not then reported. Other mines which reported both times have increased the tonnage formerly produced by each unit. These two sources of error may possibly balance each other, but this can not be determined until the tonnage figures for the year 1930 are compiled by the United States Bureau of Mines.

The purpose of this article, therefore, is to describe the present development of mechanized loading without attempting to say what the proportion of increase has been in the tonnage produced. We can state with certainty that the use of mechanized loading equipment is growing, that new installations are being made. and that the established installations are increasing their production. With this as an accepted fact, it may be of some interest to see the manner in which the various types of equipment are being applied successfully. This has been done by making several classifications as shown in the following tables.

Table No. 1 shows the number of mines and the number of equipment units divided geographically into the following six fields.

(*1*) *The Central Field—including Indiana, Illinois and western Kentucky.*

(*2*) *The Northern Appalachian Field —including Ohio, Pennsylvania, Maryland and northern West Virginia.*

(*3*) *The Southern Appalachian Field —including Virginia, southern West Virginia, eastern Kentucky, and Tennessee.*

(*4*) *The Southern Field — including Alabama, Arkansas, and Oklahoma.*

(*5*) *The Missouri-Kansas Field—including Iowa, Kansas, and Missouri.*

(*6*) *The Rocky Mountain Field—including Montana, Wyoming, Utah, Colorado and New Mexico.*

This division was made to combine the mines where conditions are more or less similar or where the same factors of seam, market and labor conditions apply. It will be noticed that in every coal field there was an increase in the number of mines and the number of equipment units over our previous report. This applies to the totals for each district and also applies to most of the classifications made in the district. In the latter case there are a few exceptions, and it will be noticed that the biggest percentage of increase in each field has been in mines where only one type of equipment is used, while mines using two or more types of equipment are not reporting any marked amount of additions.

The last three columns of *Table No. 1* show the seam heights operated. In the Central and the Rocky Mountain Fields the mechanized operations are predominately in high and medium coal, while in the Northern Appalachian most of these are in medium and low coal. In the Southern Appalachian Field the operations are fairly well divided among the three classes of seam heights, while in the Southern Field most of the operations are in low coals. With the exception of the Northern Appalachian Field, where there are a number of mines using conveyors and scrapers in the low coals of central Pennsylvania, the seam heights operated mechanically in each district are approximately in the same proportion to those mined by hand.

Table No. 2 shows the direct comparison between the different types of loading units used in the different geographical fields. The columns read vertically summarize the operations in each field while the lines read horizontally show how the same type of equipment or the same combinations of different types are distributed across the fields. In using this table it must be kept in mind that the figures show the number of mines which use mechanized loading but do not indicate the tonnages which are loaded mechanically. Consequently this table does not furnish any basis for a tonnage comparison between the different fields or between different equipment in the same field. This table is submitted for the purpose of showing how the classes of mechanized operations vary in each field and also to show which type of equipment predominates.

Table No. 3 shows the number of mechanized loading units in operation, classified according to whether they are used singly or in combination with other types. The additions at the bottom of the page show the total number of each type installed and the sum of these amounts to a total of 3,419, which represents the number of units now operating. The tonnage produced by each class of equipment can not be figured exactly from the information on hand because of the variance in the tonnages produced by the same type of machines at different mines and also by the amount of time which each mechanized mine operates. However, by taking average production figures and applying them to the equipment units as shown in table 2 we can estimate that the total production of mechanically loaded coal in the United States should be roughly accord-

TABLE No. 1
Number of Mechanized Mines and Equipment Units in Operation

CENTRAL FIELD—Illinois, Indiana and Western Kentucky

Types	Number of mechanized mines 1929	Number of mechanized mines 1930	Units of equipment 1929	Units of equipment 1930	Number of mechanized mines in various seam heights: Over 6 ft. 1929	Over 6 ft. 1930	From 4 to 6 ft. 1929	From 4 to 6 ft. 1930	Less than 4 ft. 1929	Less than 4 ft. 1930
Mechanical Loaders	15	23	106	170	12	19	3	4	..	..
Pit Car Loaders	43	49	1,341	1,519	29	32	14	17	..	..
Mechanical Loaders and Pit Car Loaders	15	15	132 421	151 450	14	14	1	1	..	..
Mechanical Loaders, Pit Car Loaders, and Scrapers	1	1	1 1 2	1 1 2	..	..	1	1	..	..
TOTAL	74	88	2,004	2,294	55	65	19	23	..	..

NORTHERN APPALACHIAN FIELD—Pennsylvania, Maryland, Ohio, Northern West Virginia

Mechanical Loaders	6	11	29	37	5	7	1	4	..	..
Pit Car Loaders	7	18	41	214	4	11	3	7	..	..
Conveyors	26	42	69	127	..	1	2	9	24	32
Scrapers	11	11	54	48	..	..	1	1	10	10
Conveyors and Scrapers	3	3	6 6	7 5	..	..	..	1	3	2
Mechanical Loaders and Pit Car Loaders	2	6	10 22	29 70	2	3	..	3	..	..
Scrapers, Conveyors and Pit Car Loaders	0	1	0 0 0	3 2 1	..	..	..	..	..	1
Mechanical Loaders and Conveyors	0	2	0 0	2 12	..	..	..	..	..	2
TOTAL	55	94	237	557	11	22	7	25	37	47

SOUTHERN APPALACHIAN FIELD—Southern West Virginia, Virginia, Eastern Kentucky, Tennessee

Mechanical Loaders	13	17	21	43	13	14	..	3	..	..
Pit Car Loaders	1	2	6	8	..	1	1	1	..	..
Conveyors	6	15	15	37	..	..	1	6	5	9
Scrapers	2	2	5	5	..	..	..	..	2	2
TOTAL	22	36	47	93	13	15	2	10	7	11

SOUTHERN FIELD—Alabama, Arkansas, Oklahoma

Pit Car Loaders	3	3	33	34	3	3	..	..	..	..
Scrapers	1	1	4	4	..	..	..	..	1	1
Conveyors	15	18	43	64	1	..	2	3	12	15
Scows	4	3	9	7	..	..	..	..	4	3
Conveyors and Scows		3	6 3	6 3	..	..	..	..	3	3
Conveyors and Pit Car Loaders	5	4	20 39	18 17	1	..	..	2	4	2
Pit Car Loaders, Scrapers, and Conveyors	1	1	22 3 3	22 3 3	..	..	1	..	..	1
Conveyors and Scrapers	0	1	0 0	5 2	..	..	..	..	..	1
Conveyors and Mechanical Loaders	0	1	0 0	1 1	..	1	..	..	..	..
TOTAL	32	35	185	190	5	4	3	5	24	26

MISSOURI-KANSAS

Conveyors	0	4	0	13	..	..	..	..	..	4

ROCKY MOUNTAIN FIELD—Montana, Wyoming, Colorado, New Mexico

Mechanical Loaders	11	14	53	58	11	13	..	1	..	..
Pit Car Loaders	4	7	33	36	2	6	2	1	..	..
Conveyors	10	15	18	26	4	7	3	7	3	1
Scrapers	3	3	6	6	2	2	..	..	1	1
Mechanical Loaders and Pit Car Loaders	1	1	3 7	12 7	..	..	1	1	..	..
Mechanical Loaders and Conveyors	3	3	6 13	6 13	2	3	1	..	..	..
Mechanical Loaders and Scrapers	2	2	5 4	6 3	2	2	..	..	..	..
Conveyors and Pit Car Loaders	9	9	39 15	40 16	4	4	5	5	..	..
Scrapers and Conveyors	1	1	1 1	1 1	1	1	..	..	..	..
Scrapers and Pit Car Loaders	1	1	2 2	2 2	..	..	1	1	..	..
Pit Car Loaders, Conveyors and Scrapers	1	1	10 14 5	10 14 5	1	1	..	..	..	..
Mechanical Loaders, Conveyors, and Scrapers	1	1	1 6 1	1 6 1	1	1	..	..	..	..
TOTAL	47	58	245	272	30	40	13	16	4	2
TOTAL FOR UNITED STATES	230	315	2,718	3,419	114	146	44	79	72	90

TABLE No. 2
Number of Mechanized Loading Mines Classified By Types of Equipment Operated

	Total U. S.	Central	Northern Appalachian	Southern Appalachian	Southern	Rocky Mountains	Missouri Kansas
Mechanical loaders	65	23	11	17	..	14	..
Pit car loaders	79	49	18	2	3	7	..
Conveyors	94	..	42	15	18	15	4
Scrapers	17	..	11	2	1	3	..
Scows (Arkansas)	3	..	..	..	3	..	..
Mechanical loaders and pit car loaders	22	15	6	..	..	1	..
Mechanical loaders and conveyors	6	..	2	..	1	3	..
Mechanical loaders and scrapers	2	..	..	..	..	2	..
Pit car loaders and conveyors	13	..	..	..	4	9	..
Pit car loaders and scrapers	1	..	..	..	..	1	..
Conveyors and scrapers	5	..	3	..	1	1	..
Conveyors and scows	3	..	..	..	3	..	..
Mechanical loaders, pit cars and scrapers	1	1	..	..	..	..	..
Mechanical loaders, conveyors and scrapers	1	..	..	..	..	1	..
Pit car loaders, conveyors and scrapers	3	..	1	..	1	1	..
Total	315	88	94	36	35	58	4

TABLE No. 3
Number of Mechanized Loading Units in Mines Operating One or More Types of Equipment

	Mechanized Loaders	Pit Car Loaders	Conveyors	Scrapers	Scows
Mechanical loaders	308	.....	...	...	...
Pit car loaders	...	1,811	...	...	...
Conveyors (including duckbills)	..	.....	267	...	...
Scrapers	...	.....	...	63	...
Scows (Arkansas)	...	.....	...	...	7
Mechanical loaders and pit car loaders	192	527	...	...	...
Mechanical loaders and conveyors	9	.....	26	...	...
Mechanical loaders and scrapers	6	.....	...	3	...
Pit cars and conveyors	...	33	58	...	...
Pit cars and scrapers	...	2	...	2	...
Conveyors and scrapers	...	.....	13	8	...
Conveyors and scows	...	.....	6	...	3
Mechanical loaders, pit car loaders and scrapers	1	1	...	2	...
Mechanical loaders, conveyors and scrapers	1	.....	6	1	...
Pit cars, conveyors and scrapers	...	33	19	11	...
Total units, 3,419	517	2,407	395	90	10

TABLE No. 4
Number of Mechanized Loading Mines Classified by Heighth of Seams

	Total Mines	Heighth of Seam		
		Over 6 ft.	From 4 to 6 ft.	Lessthan 4 ft.
Mechanical Loaders	65	53	12	..
Pit Car Loaders	79	53	26	..
Conveyors	94	8	25	61
Scrapers	17	2	1	14
Scows	3	...	...	3
Mechanical Loaders and Pit Car Loaders	22	17	5	...
Mechanical Loaders and Conveyors	6	4	...	2
Mechanical Loaders and Scrapers	2	2	...	...
Pit Car Loaders and Conveyors	13	4	7	2
Pit Car Loaders and Scrapers	1	...	1	...
Conveyors and Scrapers	5	1	1	3
Conveyors and Scows	3	...	...	3
Mechanical Loaders, Pit Car Loaders and Scrapers	1	...	1	...
Mechanical Loaders, Conveyors and Scrapers	1	1	...	...
Pit Car Loaders, Conveyors and Scrapers	3	1	...	2
Total	315	146	79	90

ing to the percentages shown in the following figures:

	Percent
Mechanical loaders	47
Pit car loaders	35
Conveyors	15
Scrapers	3

Keeping in mind that these figures are only estimates, a comparison with similar figures prepared during the early part of the year shows that there has been a gain in the percentage of total production mined with mechanical loaders and conveyors.

Table No. 4 shows a number of mechanized loading mines operating in three seam classifications of high, medium and low coal—high coal including seams greater than 6 ft. and low coal seams less than 4 ft. This shows that thick seams have the greatest number of mechanized mines and that there are a slightly greater number of mines using loading equipment in low than in medium seams.

On a percentage basis 46 percent of the mines are in high coal, 25 percent in medium coal and 29 percent in low coal. Again it is necessary to state that this does not represent tonnage produced, but simply the number of operating mines. The interesting feature of this compilation is that it indicates that less than half of the mechanized mines are in seams lower than 6 ft. in height. This is somewhat contrary to the general belief. It is of further interest to note that in seams less than 6 ft. in height the number of mechanized mines are fairly evenly divided between the medium and low coals. It is frequently stated that mechanized loading is suitable only for two classes of seams—(1) where the coal has sufficient thickness to justify the installation of a large unit and (2) where the coal is of low height and mechanized loading will eliminate rock brushing. The fact brought out in *Table 4*, showing that 25 percent of the mines are in seams between 4 and 6 ft. high, indicates that mechanized loading can compete directly with hand loading without the advantage of high coal and without the savings made by the elimination of rock brushing in low coal.

COAL

NEWELL G. ALFORD
Editor

Practical Operating Problems of the Coal Mining Industry

Adopting Mechanical Mining

at the HANNA COAL COMPANY

By R. V. Clay*

EARLY in 1928 it was decided that, due to the falling market price and to lower wage competition, it would be necessary to either cut wages or lower our cost some other way. We preferred not to reduce wages, but try to meet the keen competition by reducing our cost in the use of new methods, of concentration and increased efficiency.

Our mines are in the Pittsburgh No. 8 seam of coal in southeastern Ohio. The seam runs from 4½ to 5 ft. in thickness and has an average of 1 ft. of draw slate over it. Over the draw slate is a parting of coal which forms our roof as long as it will stay up, and over this coal is from 5 to 8 ft. of fire clay. On account of these roof conditions, we drive our entries 8 ft. wide, our rooms 22 ft. wide on 30-ft. room centers and do not recover our room pillars.

Our first step toward mechanical mining was made when we tried out a duckbill with a shaking conveyor at our No. 9 mine. During the first part of 1929, we did considerable experimenting at this mine with duckbill loading, but delayed purchasing more of them until our Simon-Carves cleaning plant was finished. The cleaning plant was finished in October, 1929. By this time our experiments with the duckbill convinced us that it would drive entries much faster and more economically than we had ever been able to drive them before. *Figure 1* shows the standard development set-up now in use for the development of our entries. (We now have an Oldroyd cutting and shearing machine and a Whaley loading machine in entry work, and our duckbill units (we now have eight of these units) will still be available for isolated entries that must be pushed.)

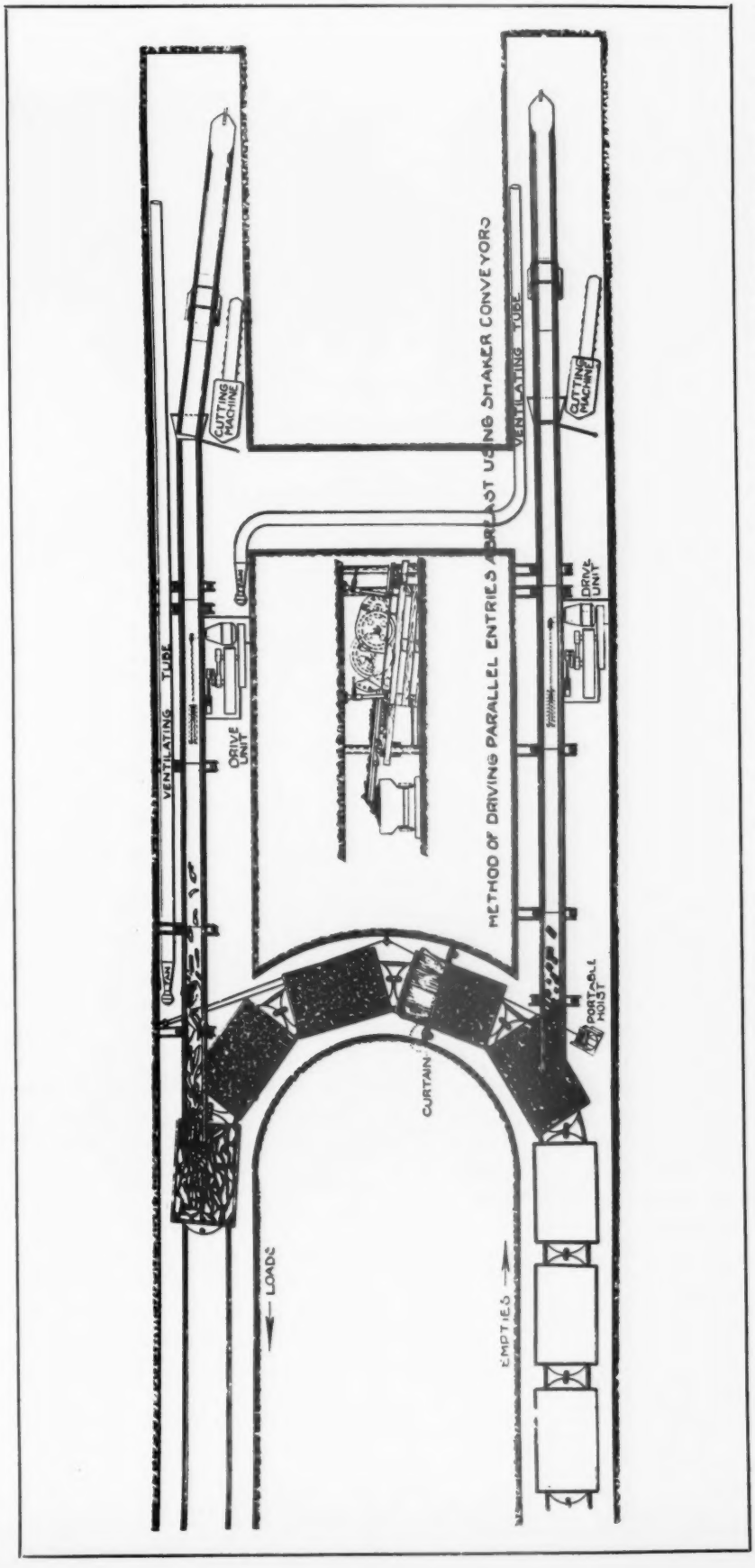
The latter part of 1929 it was decided to try out a new type of cutting machine. The Oldroyd Universal cutting machine was selected for the purpose. The trial proved successful, and we are gradually changing to this machine for general use. The use of this machine made it necessary to adopt 30-pound rail in the rooms and entries and No. 2½ turnouts into the rooms. The use of the

PRODUCTION AND MAN-HOURS PER TON TABLE

OPERATION	PRODUCTION UNIT	TIME PER UNIT	NUMBER OF UNITS PER 8 HOURS	NO. MEN IN CREW	HOURS WORKED	MAN-HOURS PER TON
WHALEY LOADER	1 CUT 23' WIDE 8.5 DEEP	.532 MIN	9 CUTS 318 TONS	2	8	.0503
GATHERING MOTOR	" " "	532 MIN	CUTS 318 TONS	2	8	0503
OLDROYD CUTTER	" " "	351 MIN	12.8 CUTS 454 TONS	2	8	.0503
DRILL & SHOOT COAL	" " "	952 MAN MIN.	10.1 CUTS 357 TONS	2	8	.0503
TRACKMEN	" " "	948 MAN MIN	10.2 CUTS 361 TONS	2	8	0503
DRILLING SLATE & POSTING	" " "	1013 MAN MIN	9.5 CUTS 336 TONS	2	8	.0503
SLATEMEN	" " "	2527 MAN MIN	9.5 CUTS 336 TONS	5	8	.1260
FOREMAN				1	8	.0252
TOTAL				18	144	.4530

REMARKS: The "Man Hours per Ton" column is based on the production of the Whaley Loader (318 tons). Tonnages shown opposite each item of labor in "Units per 8 Hours" column are indicated only to show that each group is capable of keeping ahead of the loader. Tonnages shown for each item of labor are based on results of time studies made on each group of men.

* Assistant General Manager, Hanpa Coal Company.



heavier rail and larger turnouts, together with the Universal cutting machine, works into our mechanization program nicely.

In July, 1930, two loading machines were put to work in room work in this mine. After a trial period of three months, our experience indicated to us that the track-mounted machine was more suitable to our conditions and worked better with our track-mounted cutting machine. *Figure 2* shows a time study that was taken during the trial period on the track-mounted machine. Time studies were also made of the clean-up crew back of the loading machine to determine the correct number of men and the crew necessary for the proper operation of the loading machine. Analysis of these time studies indicated that 10 rooms with a crew of 18 men were sufficient for the proper operation of the loading machine. The production schedule, as shown by *Figure 3*, has been made up and is now in successful operation at this mine. (We hope to get a loading machine in the near future, which, we believe, will gob the draw slate and clean up the room after the coal-loading machine, and, in this way, further mechanize our work.)

To help the haulage on the loading machine, we have driven butt entries on a 45 degree angle from the face entry and then turned our rooms at a 45 degree angle from the butt entry onto the face. From the good results obtained so far, it looks as though this method of work should become standard.

Our next move must be to get a mine car of sufficient capacity to properly serve the loading machine. So far we have used the mine cars on hand, which have a capacity of two tons, mechanically loaded. We have coming, on trial, a 5-ton capacity mine car of an entirely new design, which we hope will exactly meet our needs.

If the mine car is successful, we estimate that for 1,000 to 1,200 tons production per eight-hour shift, we will need the following equipment: 3 Oldroyd Universal cutting machines, 3 Whaley Automats for loading the coal, 3 electric drill outfits, 3 battery locomotives, 3 "swing" motors working between the loading unit and the dump, seventy-five 5-ton mine cars.

We have estimated that it will take three swing motors for this work, feeling that we could replace extra mine cars with these swing motors. However, if this does not work out, we can substitute more mine cars for one or two of the swing motors. With the above set-up, we should get a decrease in cost from 25 to 30 percent.

While we were experimenting with mechanical mining and mechanical cleaning at No. 9 mine, it was necessary to

reduce cost at our other mines. Due to the fact that we did not have the advantage of cleaning plants at our other mines, mechanical loading was out of the question. The problem was solved, however, by installing Oldroyd Universal cutting machines and electric drills, which allowed us to concentrate and increase the efficiency of our hand loading very materially.

This concentration and efficiency has been arrived at as follows:

(1) The mine was put entirely on a day-work basis and all tonnage rates abolished.

(2) Entries are driven on a day-work basis, a cut of entry being required as the necessary work per man per shift.

(3) For a production of 2,000 tons per eight-hour shift, five pairs of butt entries were developed with the rooms necked; 30-pound rail was used, all laid on steel ties with No. 2½ turnouts purchased complete with the necessary steel ties and kick switches.

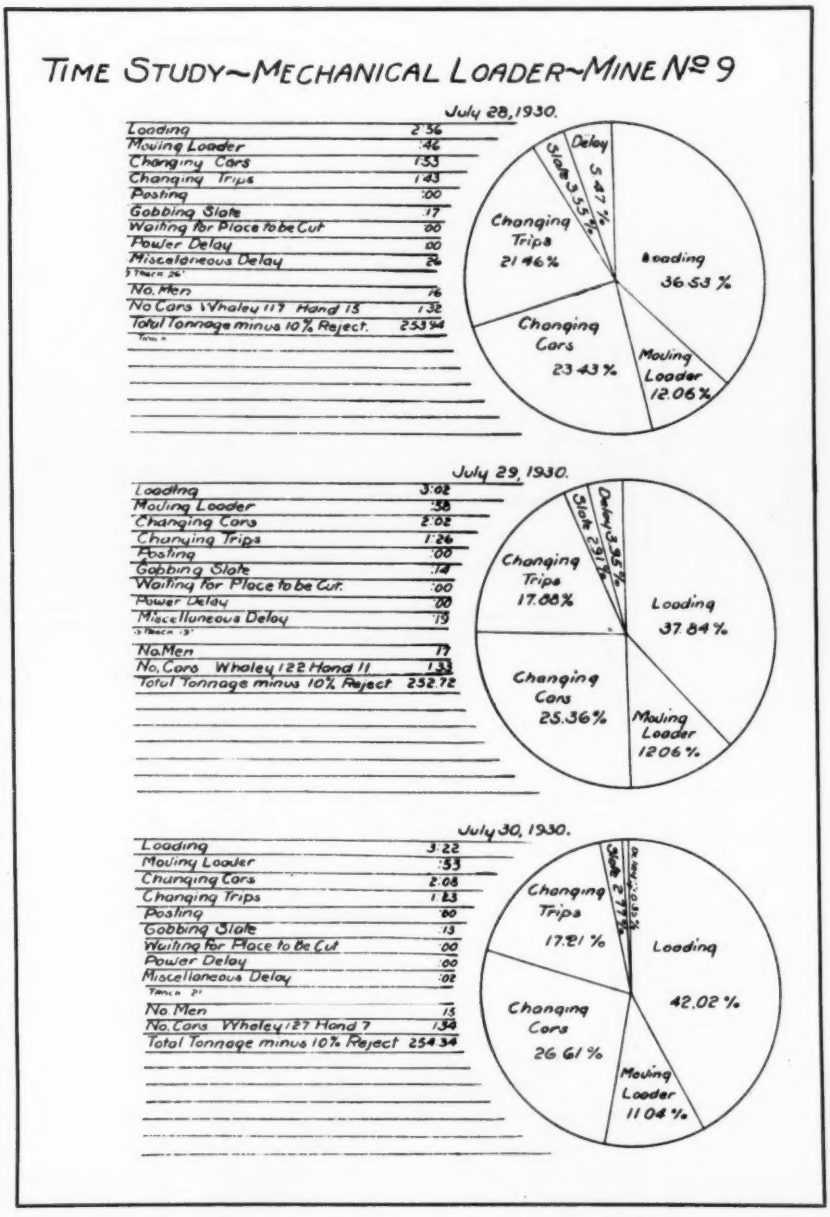
(4) Oldroyd cutting and shearing machines are used, cutting on the bottom and shearing in the middle of the room.

(5) Electric post drills are used. The drilling and shooting being done by company men and the explosives being furnished by the company. Each set of drillers and shooters have a truck which is of light construction and which they push from place to place in order to get their equipment around.

(6) Transportation to the passway is either crab reel motor or mule.

(7) The organization for a pair of butt entries is as follows: 1 section boss, 2 cutters, 2 drillers and shooters, 2 track layers (who lay all track and relieve the loader of this work), 1 motorman, 1 brakeman (or 2 drivers), 30 loaders (hand).

The drillers and shooters, track layers, motormen and drivers are paid on a straight, day-work rate. The cutters and loaders are paid on a graduated day-rate basis, their day rate being determined by the number of tons of coal they average per day for the pay period. The cutters and loaders are penalized if they do not show up for work on any working day in the following manner. They are, of course, not paid for the day they miss, but the day is taken into account in figuring their daily average tonnage which determines their rate. (They are, of course, not penalized if they are excused by the section boss or, in case of sickness, if they send word to the mine.) In like manner, the company is penalized if, due to a major breakdown, they keep the men in the mine and do not furnish them cars to load. The men are, of course, paid for the time they are at their working places, but the time during which they were not furnished cars is not taken into account in figuring their average daily tonnage.



A pair of butt entries with the above organization has averaged as high as 420 tons per day for a pay.

The results of the concentration program, as worked out for our No. 6 mine, is shown in the following figures:

This plan of work is being put into operation at all our mines as fast as we can accomplish it. Then, as mechanical cleaning plants are installed, we will substitute mechanical loading machines with crews for the 30 loaders in a section and get the further reduction in cost, due to the mechanical loading machine.

	Prior to Concentration	After Concentration
Cutting machines in use	17	8
Gathering locomotives in use	10	7
Face entries developing	10	4
Butt entries developing and working	41	20
Average number of feet of entry driven per pay, per single entry	29	113
Average daily tonnage per loader ....tons..	8	12
Average daily tonnage per cutting machine in wide work....do....	150	380
Haulage system (primary) ....feet..	26,900	16,000
Decrease in percent of slack, due to shearing and company shooting ....percent..	.....	4
Increase in earnings of production men, on the same wage scale basis..do....	.....	10
Reduction cost on the same wage scale basis ....do....	.....	18

The Aersand Coal Cleaning Plant

of the Allegheny River Mining Co.

By
CHARLES M. MEANS*

AN INNOVATION for removing impurities from coal makes its initial bow to the industry. It is known under the trade name of "Aersand" and consists of a new and unique artificial dry fluid used as a medium for segregating coal and impurities, such as slate, pyrite, bone, and other impurities having a specific gravity greater than coal. The medium used is created by bubbling air continuously up through a body of common sand of about 20-mesh and finer. When thus aerated the sand is slightly distended and the individual particles are thrown into motion and the mass becomes an apparent liquid and will flow on a slight incline. It has the physical properties of a liquid in so far as density is concerned. The specific gravity of this medium may be varied within certain limits by adjusting the flow of air, and also by varying the character of sand. With ordinary silica sand the specific gravity may be so adjusted that bituminous coal will float and the refuse material sink. Its action corresponds to the well-known float-and-sink operation, but in a dry medium.

This development is the result of several years of research work in the laboratory and a large amount of experimentation with a semicommercial plant. In the earlier stages of investigation it was found that the sand would adhere to clean, wet coal and was difficult to dislodge, and it was feared that it might be a definite handicap to the process. The idea also prevailed that the sand would become coated with fine dust and intermingle with the smaller particles of coal, thereby reducing its efficacy. A device for washing and drying the sand was actually considered. Continued experimentation indicated that these two apparent barriers to success were less formidable than theory indicated. At this stage a preparation plant on a commercial scale was built, and it is interesting to note just what occurred with respect to the two problems noted above. After being used in regular service it was found that very little sand adhered to the coal, and when it did was very easily dislodged. It developed that when the mine-run coal passed over the tipple screen more or less fines adhered to the coal particles, and when these came in contact with the sand the moisture was pretty well absorbed by the layer of coal fines, and the sand had little tendency to adhere. It was also found that particles of coal corresponding in size to that of the sand would intermingle with it, but did not in any way interfere with the successful operation, even when the coal content reached 50 percent. It was found, however, that when considerable wet coal was encountered a small amount of heat applied directly to the sand or in the air stream was required to prevent caking of the sand.

In operation the "Aersand" separator is simply a stationary rectangular box in which a moving bed of sand is kept in a liquid condition by bubbles of air admitted through the bottom. A stream of sand is fed to the box continuously at the feed end and discharged at the clean coal end. This maintains a moving current of the fluid sand that carries the coal along through the box and over the discharge lip. The refuse sinks to the bottom of the box and is discharged through a refuse chute extending across the entire width of the separator below the coal overflow lip. This chute is offset from the front of the box to permit complete and uniform aeration of the sand body in the separator proper without blowing the sand in the discharge chute. In this way the sand is deaerated and becomes inert nonmobile sand. In this condition the flow may be sealed off simply by placing a horizontal plate at the bottom on which the sand will run out and close itself on the natural angle of repose. This plate is an oscillating gate which regulates the discharge of material here in the same manner as a reciprocating plate feeder. A ribbed rotating shaft at the coal discharge lip maintains a uniform and evenly distributed overflow. A bell crank on this shaft drives the slate gate. These two small elements are the only moving parts integral to the device. The porous separator floor through which air is admitted is of alundum and is particularly suited for the uniform distribution of the small quantity of air used to fluidize the

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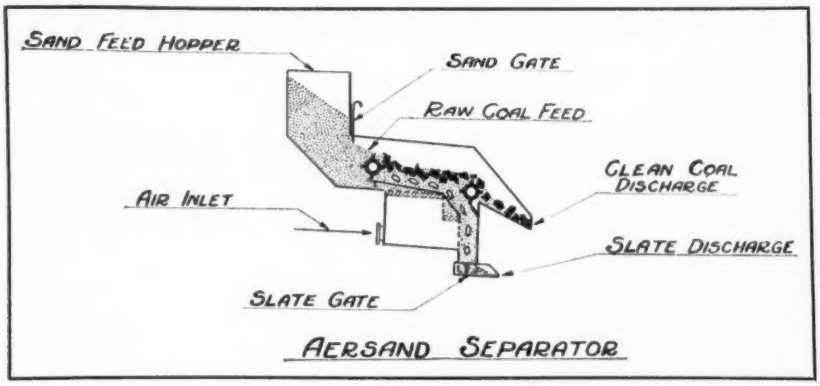


Figure 1

sand. In this process the function of the air is not to lift the coal but merely aerate the sand. The amount of air used is virtually the same for all sizes of coal and varies from 20 to 40 cu. ft. per minute per square foot area, the exact amount depending upon the specific gravity desired.

The machine shown in *Figure 1* is a single element consisting of one float and sink section and one refuse gate. This is the unit of operation and may be designated as a one stage or single pass machine. For more effective separation the use of a longer machine with two or more float sections can be used. The multiple unit is virtually a series of single elements but it is built as a continuous trough with the sand flowing through the entire machine.

A two-stage machine is shown in *Figure 2*. This unit is designed for the retreatment of the refuse and when so operated the raw coal is fed at approximately mid length of the trough and passes over the second float compartment only. The primary refuse discharged at No. 2 gate is returned with the sand circulation to enter the first compartment where it is again subjected to floating action. The final refuse is discharged at No. 1 gate and goes to the refuse bin while the recovered coal passes to the feed compartment. This machine may also be set up to reclean the coal instead of the refuse, in which case the raw coal is fed into the first compartment and the clean coal passes to the second, where it is again subjected to floating.

If so desired retreatment of both the primary refuse and the coal can be accomplished in a three-stage machine. In all cases the complete operation takes place in one continuous stream of sand without re-elevation. No transfer of material to other machines is necessary and no additional machinery required beyond that used to circulate the medium in a single machine.

The float section of the separator is 2 ft. in length and the refuse discharge section is 10 in., making a total length of aerated surface of 2 ft. 10 in. The overall length of the single pass machine is approximately 5 ft. The two-stage machine 8 ft. and the three-stage machine 12 ft. Machines of varying widths may be built to suit any capacity required. The actual capacity of this or any other concentrating device is dependent upon the ease of separation of the raw material, its size and other characteristics. In the case of readily cleaned nut or pea coal or mixed sizes the capacity with good cleaning performance will average 8 to 10 tons per hour per foot of width. It is apparent that the very fine coal and dust must be screened out but all coal over ⅛-in. mesh

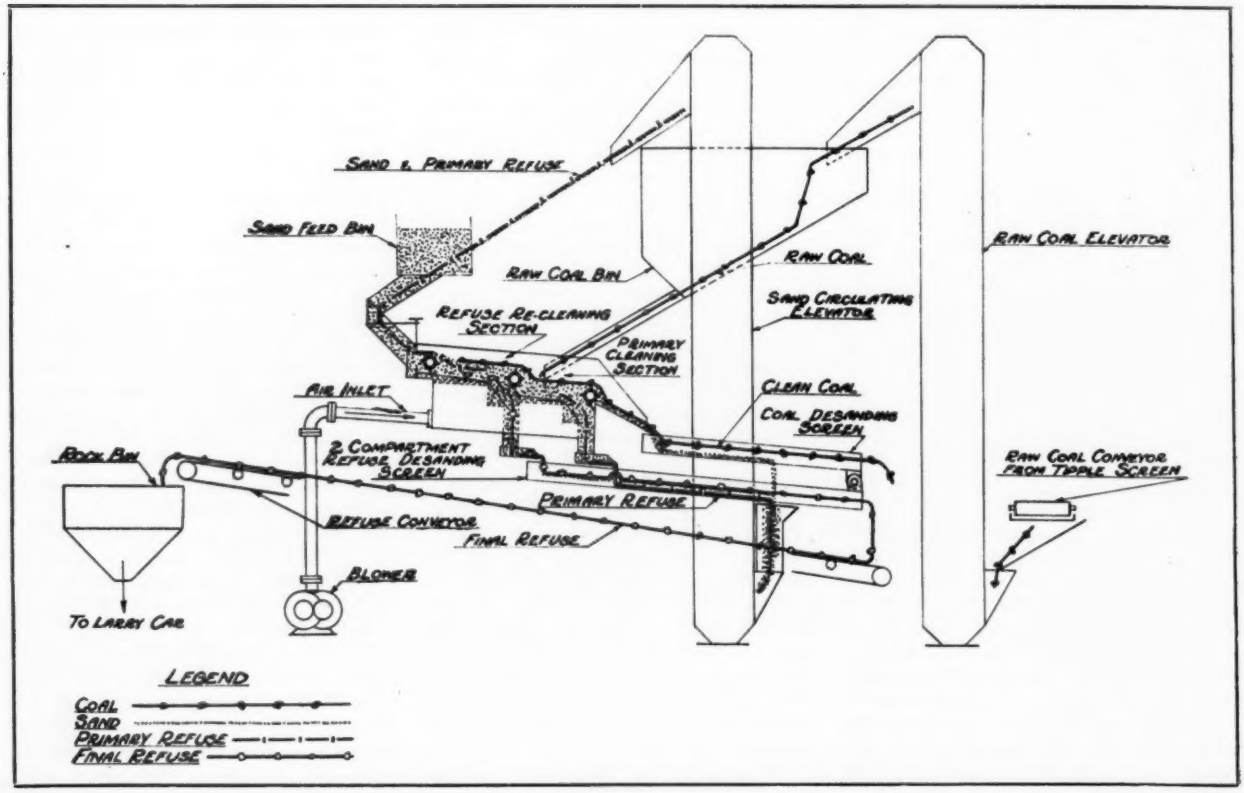


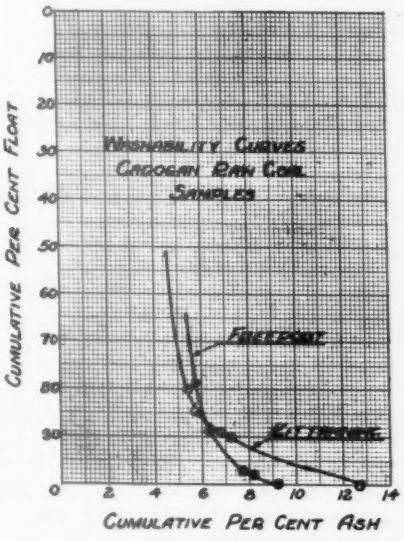
Figure 2

can be cleaned successfully but commercial requirements will probably be for 4-in. or smaller. It is not necessary to separate the various sizes between these limits for successful preparation.

One unit of a plant as described, has been installed at the Cadogan mine of the Allegheny River Mining Co., at Kittanning, Pa., by the Hydrotator Co. under the supervision of Mr. Thomas Fraser. This plant handles coal from the Lower Freeport and Lower Kittanning beds. The normal mixture is about 40 percent from the Freeport seam and 60 percent from the Kittanning seam, but the mixture at any time may be in any ratio. These two coals are very different in washability characteristics and the constantly changing condition increases the difficulty of separation. Most of the coal is produced with scraper loaders which precludes the possibility of any attempt of cleaning at the face. Each of the beds average 40 in. in thickness in this area. The Freeport in section consists of 40 in. of coal with irregularly distributed and discontinuous thin partings of slate and sulphur varying from 1/32-in. to ½-in. in thickness. In many sections a considerable thickness of bone is also present. The principal impurities in the coal as delivered to the tipple are dull bone particles, streaked pieces and roof slate.

The Kittanning bed contains more heavy partings than the Freeport. A typical section shows a few inches of bony coal at the bottom, a slate or sulphur parting varying from ½ in. to 2 in. thick about 20 in. from the bottom and 4 in. of bone coal at the top. All the bone coal is left in place in mining but in some locations the roof bone comes down with roof slate and becomes intermixed with the small coal. The principal impurities as delivered to the tipple are roof slate and sulphur and slate from the partings.

The Kittanning coal contains a much higher percentage of refuse as compared to the Freeport and the particles are larger and heavier, making an easier cleaning condition. The cleaning characteristics of the two coals are shown by the accompanying float-and-sink data and curves. Examination of the raw coal indicates that the most economical separation between coal and refuse is at approximately 1.60 specific gravity although this point is difficult to



determine precisely because of the varying mixture of two radically different coals. Installation of this initial unit was started July 1, 1930, and the first attempt to handle coal was made September 12, and placed in regular service during the month of October. Based on the results secured a second unit was ordered and construction is now under way. The two units will use a common sand circulating elevator and when completed the cleaning plant will have an approximate capacity of 100 tons per hour when handling coal through a 2-in. lip screen and over a ½-in. square hole inclined vibrating screen.

Performance records since the plant was placed in operation show a shipped coal varying from ½ percent to 1½ percent in sink content and a final refuse varying from 2 percent to 7 percent in float content. A rather high percentage of bone coal lighter than 1.6 specific gravity necessarily goes into the refuse when the feed runs preponderately to Freeport coal, otherwise the product would carry a detrimental proportion of bone coal. On a 100 ton per hour basis the requirements per ton of coal cleaned are as follows: Power, .5 kwh.; labor, .02 man hours; air, 1,500 cu. ft. and 3 pounds of sand. Most of the sand losses are due to leakage. This implies an operating cost of 2.6 per ton which is exclusive of capital charges.

FLOT-AND-SINK TESTS OF CADOGAN RAW COAL SAMPLES—NUT AND PEA SIZES

	FREEPORT				KITTANNING			
	Percent weight		Percent ash		Percent weight		Percent ash	
Specific gravity	Direct	Cumulative	Direct	Cumulative	Direct	Cumulative	Direct	Cumulative
Float on 1.35	78.9	78.9	5.8	5.8	79.8	79.8	5.4	5.4
1.35 to 1.45	10.2	89.1	10.1	6.3	5.4	85.2	12.1	5.8
1.45 to 1.60	8.1	97.2	24.0	7.7	3.6	88.8	29.3	6.8
1.60 to 1.80	1.1	97.2	47.7	8.2	1.0	89.8	45.1	7.2
Sink in 1.80	1.7	100.0	64.5	9.2	10.2	100.0	59.8	12.6

These data show the relative characteristics of the two beds mined at Kittanning but are not presented as showing "normal" composition of the raw coal from the two seams. The percentage of refuse delivered with the coal when mechanically loaded varies greatly, particularly in the Kittanning operation.

LEGISLATIVE REVIEW

(*From page 36*)

Mr. Cable (Rep., Ohio). This bill would forbid further immigration if the Department of Labor certifies that laborers of any class, skilled or unskilled, are not needed in the United States. Immigration.

H. R. 13565. Mr. Bachmann (Rep., W. Va.). This bill proposes to exclude immigrants from countries with which the United States has no diplomatic relations, and is aimed particularly at communists from Russia. Immigration.

H. R. 14830. Mr. Burtness (Rep., N. Dak.). This bill proposes to pay $15,170 to the Lehigh Briquetting Co., of Lehigh, N. Dak., as a refund of duties paid on machinery and equipment imported in 1928 for its carbonizing and briquetting plant. Claims.

S. 4837. Mr. Hayden (Dem., Ariz.). To pay $515 to the Copper Ridge Mining Co., representing payment of purchase money in connection with a mineral entry at the Phoenix land office. Public Lands.

COAL PREPARATION METHODS GREATLY IMPROVED IN ALABAMA

Important progress in methods of coal preparation in Alabama has been attained in the past five or six years, according to information obtained in connection with the cooperative coal washing investigations of the Southern Experiment Station of the United States Bureau of Mines, Department of Commerce, and the University of Alabama.

Until about eight years ago, picking belts and jigs were used almost exclusively in the washeries for cleaning all sizes of coal. In 1922, the first coal cleaning table in the district was installed. Since then at least a dozen table plants have been installed in different washeries, for cleaning the fine sizes of coal. One well known manufacturer of coal jigs reports that since designing an automatic refuse draw about two years ago, he has installed this appliance in seven of the washeries using his type of jig. Another innovation in the district is a dry cleaning plant that was recently put in operation. In this plant air tables are used exclusively for cleaning all sizes of coal except the lump, which is hand-picked. Methods of preparation are being improved to meet competition which is continuously increasing and in order to give the consumer a product better suited to his demands. Makers of metallurgical coke for blast furnace use are also aware of the importance of low ash coke in reducing the cost of pig iron and realize that added expenditures in the preparation of coking coal are very often a good investment due to a resulting lower ash content in the manufactured coke.

Economic losses

in the PENNSYLVANIA BITUMINOUS MINING INDUSTRY

resulting from injury

By Rush N. Hosler*

THE feeling that coal mining is a hazardous occupation and necessarily must take its toll of life and limb has grown with the development of the mining industry until it has taken such deep root that it has been well nigh impossible to shake it loose. This feeling still exists to some extent, evidence of which is manifested by the attitude assumed by some connected with the industry. Time was when a personal injury, yea, even death, was regarded simply as an unfortunate or regrettable incident, but not so today. With the inception of workmen's compensation, injuries and deaths cost money. It is the recognition of this fact that has led the industry out of its lethargic state and into the acknowledgment that accident costs are an integral part of the cost sheets. Therefore, what was once regarded as an occupational hazard to be assumed by the workman himself has developed into an economic problem.

It is because of the cost of work injuries that accident prevention work has received its greatest stimulus. Mining executives are more impressed with their accident record when the cost sheets show a jump in the cost per ton of coal from this cause and their interest is manifested by directing well organized efforts in safer practices. There is a recognition on their part that a saving in this item of cost is as real as a like saving in haulage, maintenance or any other item.

THE title of this paper presumes there is an economic loss resulting from injury to the industry but, before we proceed further, it may be well to prove this premise. A study of costs of injuries resulting from work in connection with the bituminous mining industry in Pennsylvania during the past five years reveals the fact that workmen's compensation and medical treatment, values at the present level of benefits, has exceeded $25,000,000, or an average of more than $5,000,000 a year. The time lost from injuries, valued in accordance with the "International Industrial Accident Commissions' Standard Weights for Lost Time Accidents" amounts to 21,384,423 lost days, equalling 85,538 man-years.[1] This is an average of 17,107 man-years lost each year. These two outstanding facts alone, not to mention other factors that must be taken into consideration, are so boldly written on the horizon of our industry that it is not necessary to present further argument that there is an economic loss resulting from injury to our workmen.

In order to present an adequate picture of this economic loss, it is necessary to give you figures from statistics, and I have prepared and present with this paper certain tables showing analyses, which if I read in detail would bore you beyond toleration. I have made certain deductions from these and other analyses[2] that bring out in detail some of the economic losses that arise from the industry. I have attempted to put enough life into these figures so that they may appear to you as a real menace, sapping the very life of the industry as a dreaded disease might sap your life, and so that you may not be bored at their presentation but rather be enlisted in a new army of "Safe Workers" whose orders are "Safely Forward."

DURING the five-year period, 1925 to 1929, there were 192,090 injuries, including fatals, that required medical attention. This means that one of these injuries occurred for every 3.36 full time employes[1] and that for each of these injuries there was mined 3,600 tons of coal. Of these 192,090 injuries, 1,972 were deaths or one death for every 350,434 tons of coal mined and one for every 327 employes. Three hundred and two men were injured severely enough to become totally disabled or one out of every 2,138 employes. For every 3,002 employes there was a hand lost, a total of 215, and with 67 of these 215 hands, the arm went too. There were 348 feet, one for each 1,856 employes and the leg went along with 139 of these. The loss of sight of one eye is rated as 30 percent[3] of total disability but where both eyes are lost, it is a total disability, and such cases were enumerated above. There were losses of sight to one eye in 433 cases. This is one out of each 1,491 employes and one for each 1,596,000 tons of coal mined. I compared this number of eyes lost with the number lost in the five-year period, 1921 to 1925, and it is interesting to note that in the last five years there were 346,000 tons more of coal mined and 230 employes more per eye lost than in the five-year period, 1921 to 1925. The improvement shown by the comparison above is directly attributed to the use of goggles and it is hoped their use might become the general practice in the industry. May I divert long enough to ask a question? How much do you value an eye—your eye, if you please?

Of injuries resulting in the loss of fingers and other permanents, there are many—one for each 255 employes, costing in excess of $3,000,000 and lost time equalling 6,575 man-years. There were 70,163 temporary injuries costing more than $7,000,000, with 11,787 man-years of lost time. It is interesting to note in passing over these accidents that this class, namely, temporaries, cost 32.9 percent of all accident cost and 13.8 percent of all lost time and that the average medical cost per case is $50.39. There are also a group of non-compensable injuries that must be reckoned with for there were 116,117 of them, carrying a cost of nearly $1,000,000 for their medical treatment, an average cost per case of $8.14.

THE pictures illustrated above might stand out more clearly when it is pointed out that for each ton of coal mined, the cost for accidents is 3.6 cents and for every ton of coal mined, there

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Presented to the Forty-fourth Annual Meeting, Coal Mining Institute of America, Pittsburgh, Pa., December 10, 1930.

BITUMINOUS PRODUCTION, FATALITIES AND FATALITY RATES, 1921-1929

Year	Production net tons (000 omitted)	2,000-hour workers			Production per man per annum (2÷3)	All fatalities	Ordinary fatalities				Ordinary fatality rate per 1,000,000 tons			Ordinary fatality rate per 1,000-2,000 hour workers		
		All	Outside	Inside			Catastrophe	All	Outside	Inside	All	Outside	Inside	All	Outside	Inside
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1926-1929	555,789	516,810	66,319	450,491	1,075	1,660	342	1,318	72	1,246	2.37	0.13	2.24	2.55	1.09	2.77
1929	142,352	123,099	15,306	107,793	1,156	378	46	332	15	317	2.33	0.10	2.23	2.84	0.98	2.85
1928	129,846	118,985	14,675	104,310	1,091	511	226	285	17	268	2.19	0.13	2.06	2.39	1.16	2.57
1927	131,645	126,788	16,771	110,017	1,038	353	6	347	22	325	2.63	0.17	2.46	2.74	1.31	2.95
1926	151,946	147,938	19,567	128,371	1,027	418	64	354	18	336	2.33	0.12	2.21	2.39	0.92	2.62
1921-1925	655,875	661,881	94,178	567,703	991	1,749	158	1,591	112	1,479	2.43	0.17	2.26	2.40	1.19	2.61
1925	135,267	128,975	16,646	112,329	1,048	312	5	307	11	296	2.27	0.08	2.19	2.38	0.66	2.64
1924	128,751	124,292	15,954	108,338	1,036	344	46	298	17	281	2.31	0.13	2.18	2.40	1.07	2.59
1923	169,181	168,802	24,407	144,395	1,002	396	...	396	29	367	2.34	0.17	2.17	2.35	1.19	2.54
1922	108,310	118,892	20,083	98,809	911	420	107	313	32	281	2.89	0.30	2.59	2.63	1.59	2.84
1921	114,366	120,920	17,088	103,832	939	277	...	277	23	254	2.42	0.20	2.22	2.29	1.35	2.45
1916-1920	831,776	870,086	150,569	719,517	956	2,336	78	2,258	185	2,073	2.71	0.22	2.49	2.60	1.23	2.88
1911-1915	779,290	851,093	109,008	742,005	916	2,423	181	2,242	153	2,089	2.88	0.20	2.68	2.63	1.40	2.82

has been 15 minutes of working time lost to the industry on account of injury.

The gist of the details presented above for the latest five-year period is, briefly, that 192,090 injuries occurred, entailing a cost of $5,000,000 and a lost time of 17,107 man-years each year. This, then, may be regarded as the direct loss. Other factors must be taken into consideration when the economic loss of work accidents is reckoned. Of these, I wish to mention two. First, the indirect cost of an accident. By this I mean the cost of the effects of an accident to the operation at the particular time. It is not necessary to enumerate what happens when an accident occurs. It will suffice to mention the things surrounding it that affects the indirect cost. Stoppage of work, often the mine shuts down for the day. The morale of the mine is broken. Breaking in new men. Discontent and strained relations between men and management. Damage and breakage to machinery and equipment with resulting curtailment of output. The indirect cost of these and other effects has been estimated at various figures ranging from two to five times the direct loss. A subcommittee on education of the Industrial Relations Committee of the American Institute of Mining and Metallurgical Engineers, a few years ago, in reporting on "Education in Accident Prevention Work," estimated that the indirect cost was at least equal to the direct cost. Using this as the basis, we see at first glance another economic loss amounting to $5,000,000 a year. Second, there is a wage loss. Reference to "Coal Mine Compensation Insurance Experience, 1925 to 1929,"[2] shows a ratio of compensation to wages of 33 percent. Using this same ratio, we find that we have a wage loss of between ten and eleven million dollars each year.

LOSSES IN BITUMINOUS MINES IN PENNSYLVANIA BY SEVERITY OF INJURY, 1925 TO 1929

Injury	No. of acc.	Total cost	Comp.	Medical	Days lost	Percent of cost	Percent of days lost
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Total	192,090	$21,665,052	$16,891,345	$4,773,707	21,384,423	100.0	100.0
Deaths	1,972	6,535,208	6,227,576	307,632	11,832,000	30.1	55.3
Permanent totals	302	1,749,663	1,668,600	81,063	1,812,000	8.1	8.5
Major permanents	2,128	4,657,563	4,149,618	507,945	3,793,200	21.5	17.7
Loss of arm	67	217,841	199,804	18,037	268,000	1.0	1.3
Loss of hand	148	354,738	324,634	30,104	488,400	1.6	2.3
Loss of leg	139	431,717	387,115	44,602	556,000	2.0	2.6
Loss of foot	209	471,008	413,284	57,724	564,300	2.2	2.6
Loss of eye	433	774,128	712,485	61,643	779,400	3.6	3.6
Disfigurement	117	76,676	59,326	17,350	29,952	0.4	0.1
Other permanents	567	1,462,585	1,285,437	177,148	700,812	6.7	3.3
Indeterminates	448	868,870	767,533	101,337	406,336	4.0	1.9
Minor permanents	1,408	642,386	530,334	112,052	506,880	3.0	2.4
Temporaries	70,163	7,135,217	4,315,217	2,820,000	2,946,846	32.9	13.8
Noncompensables	116,117	945,015	.....	945,015	493,497	4.4	2.3

INTERNATIONAL INDUSTRIAL ACCIDENT COMMISSIONS STANDARD WEIGHTS FOR LOST TIME ACCIDENTS

	Degree of disability in percent of permanent total disability	Days lost
Death	100	6,000
Permanent total disability	100	6,000
Arm above elbow, dismemberment	75	4,500
Arm at or below dismemberment	60	3,600
Hand, dismemberment	50	3,000
Thumb, any permanent disability of	10	600
Any 1 finger, any permanent disability of	5	300
2 fingers, any permanent disability of	12½	750
3 fingers, any permanent disability of	20	1,200
4 fingers, any permanent disability of	30	1,800
Thumb and 1 finger, any permanent disability of	20	1,200
Thumb and 2 fingers, any permanent disability	25	1,500
Thumb and 3 fingers, any permanent disability of	33⅓	2,000
Thumb and 4 fingers, any permanent disability of	40	2,400
Leg above knee, dismemberment	75	4,500
Leg at or below knee, dismemberment	50	3,000
Foot, dismemberment	40	2,400
Great toe, or any 2 or more toes, any permanent disability of	5	300
1 toe, other than great toe, any permanent disability of	...	.....
1 eye, loss of sight	30	1,800
Both eyes, loss of sight	100	6,000
1 ear, loss of hearing	10	600
Both ears, loss of hearing	50	3,000

THERE are, undoubtedly, other losses, but I believe I have pointed out the cardinal ones that enter into the economic losses in the Pennsylvania bituminous mining industry. They are so pronounced that they bear repeating at this time:

(1) A direct cost of accidents and injuries of more than $5,000,000 per year.

(2) An indirect cost of accidents and injuries of more than $5,000,000 per year.

(3) A wage loss on account of injuries of more than $10,000,000 per year.

(4) A loss of time of 17,107 man-years per year.

The magnitude of this loss emphasizes the necessity of eternal vigilance in our safety program. A safety program is not enough. It must be prosecuted with an exactness that permits of no let-up. Your specific attention is again called to an appalling fact brought out above, namely, that there were 192,090 injuries, and of these 1,972 resulted in death, leaving more than 190,000 that were, and like injuries in the future will be, potential deaths.

What is our responsibility then? I believe it is to see to it that this great loss shall not be permitted to continue. It can be eliminated. Known safe practices and safety devices are to be had; their cost is insignificant compared to the loss sustained without them. I close with the question, Will you enlist in the army of "safe workers" or stand idly by, contributing to this great loss, and thereby condone the suffering that goes with it?

[1] The terms "man-years" and "full-time employee" used in this paper is a 2,000-hour worker per year.

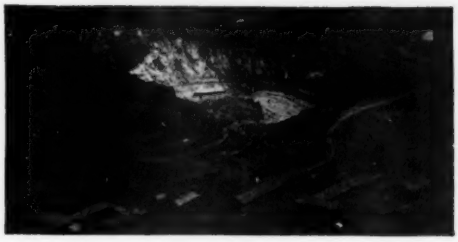
[2] "Coal Mine Compensation Insurance Experience in Pennsylvania, 1916-1929," published by the Coal Mine Section, Penna. Comp. Rating and Inspection Bureau, Harrisburg, Pa., August, 1930.

[3] This rating is based on the valuations used by the International Industrial Accident Commissions and published in their "Standard Weights for Lost Time Accidents." A copy of this table is submitted with this paper.

METALS

GUY N. BJORGE
Editor

Practical Operating Problems of the Metal Mining Industry



Mining Methods and Costs at the ARGONAUT MINE*

By William O. Vanderburg†

THE mining practices described are those used in exploiting the low-grade gold ores in the heavy and swelling ground that occurs on the mother lode belt at the Argonaut mine, Amador County, Calif.

The author acknowledges the assistance of E. A. Stent, vice president; James L. Fontenrose, cost clerk, Joseph Mohorovich, mine foreman, of the Argonaut mine; and of E. D. Gardner, supervising engineer, United States Bureau of Mines, Southwest Experiment Station, Tucson, Ariz.

Special thanks are due Mr. Stent, whose courtesy and kindness made this paper possible.

The Argonaut mine is situated 1 mile north of Jackson, the county seat of Amador County, on the mother lode belt, which traverses a region about 1 mile wide and 120 miles long in the western foothills of the Sierra Nevada Mountains. The most productive part of the belt is in Amador County, extending from Plymouth to Jackson. The district is well situated, and a number of factors contribute to low mining costs: (1) Excellent climatic conditions; (2) nearness to supply centers; (3) abundance of water; (4) low elevation (the Argonaut mine shaft collar has an elevation of 1,250 ft. above sea level); (5) cheap hydroelectric power; (6) excellent transportation facilities; (7) plentiful labor supply, except for an occasional shortage; (8) relatively small temperature increase in the mine as depth is attained.

These advantages are partly offset by: (1) Increasing cost of operation incident to the great depth to which mining has progressed; (2) the heavy and swelling ground encountered and the consequent large outlay for maintenance to keep the ground open; (3) the comparatively low grade of the ore.

The Argonaut mine produces about 260 tons of ore per day and employs a force of about 200 men. Most of the ore is free milling; it contains an average of 2 percent sulphides, mostly pyrite. The yearly average grade of the ore varies from $6 to $17 per ton. The ore is treated in the company's mill, which is equipped with 60 stamps and 36 Frue vanners. About 65 percent of the gold is amalgamated in the batteries and on plates. The sulphides are concentrated on the Frue vanners and the concentrates are cyanides locally under contract.

History

Quartz mining on the mother lode belt began in the fifties, shortly after the first excitement of placer mining in the forty-nine gold rush had subsided. The first quartz miners were mostly Mexicans, who used the arrastra method to separate gold from the ore. The early efforts at quartz mining were not very successful, due to lack of capital, crude machinery, inadequate methods of recovering the gold, inexperience in handling heavy ground, and the insecure tenure by which the mines were held.‡

Since the early days the history of most of the mines of the mother lode belt shows periods of activity alternating with long periods of idleness. The World War dealt a severe blow to the industry, due to the decrease in the purchasing power of gold. Many mines were closed down, and at present only three large mines are operating in Amador County—the Kennedy, the Central Eureka, and the Argonaut.

The Argonaut property was opened in 1850, and was worked in a desultory manner until 1893 under the name of the Pioneer mine. The Argonaut Mining Co. was organized in 1893, and an incline shaft was started on the property after good ore was discovered in the deeper levels of the adjoining Kennedy mine. Since that time operations at the Argonaut mine have been continuous except for a period of three years, when mining was discontinued, due to the results of mine fires.

Production

The total output of gold from the mother lode belt is estimated by the California State Mining Bureau to be about $240,000,000. About half of this amount was produced from the section of the belt lying between Jackson and Plymouth. From 1893 to 1930 the Argonaut mine has produced $16,377,252 (792,250 fine ounces).

* Reprinted from U. S. Bureau of Mines Information Circular 6311.

† Associate mining engineer, U. S. Bureau of Mines.

‡ The quartz mines were held under district rules formulated by the inhabitants, the majority of whom were placer miners.

Geology

The most recent geological description of the mother lode belt and its mines was written by Adolph Knopf.§

The Argonaut vein occupies the fissure of a reverse fault and cuts through beds of greenstone schist and slate, independent of either the strike or the dip of the rocks which form the walls. The vein strikes about north 20 degrees west and has an average dip of about 63 degrees northeast (see *Figure 1*). As depth is attained, the vein tends to become flatter. The maximum width of the ore shoot is 65 ft. and the maximum length 1,100 ft.. The average width mined is about 20 ft. The vein is very persistent and has been followed from the apex down to the 5,400-ft. level without a break of any kind. The quartz filling pinches and swells along both the strike and the dip but never dies out entirely.

Geological features other than size and dip which influence the choice of a mining method are: (1) The vein is accompanied on one or both walls by gouge which varies in thickness from several inches up to several feet; (2) the walls are invariably soft and fractured so that sloughing will take place promptly if the openings are not supported; (3) the vein itself is traversed by planes of weakness so that lagging of the back is necessary to prevent caving; (4) the rock masses are more or less mobile; that is, their weight is not uniformly distributed, but is transferred from point to point as the equilibrium is disturbed by new openings. Timber alone can not be relied upon for support over a large area without danger of collapse.

In general, the ore body and its walls have insufficient strength to support themselves even over small spans, so that as stoping progresses temporary timber support is required and is followed promptly by waste filling. This is the only method that has so far been found adequate for controlling the enormous weight of the shifting rock masses.

§ Knopf, Adolph, The Mother Lode System of California, U. S. Geol. Survey. Prof. Paper 157, 1929, 88 pp. Prepared in cooperation with the California State Mining Bureau.

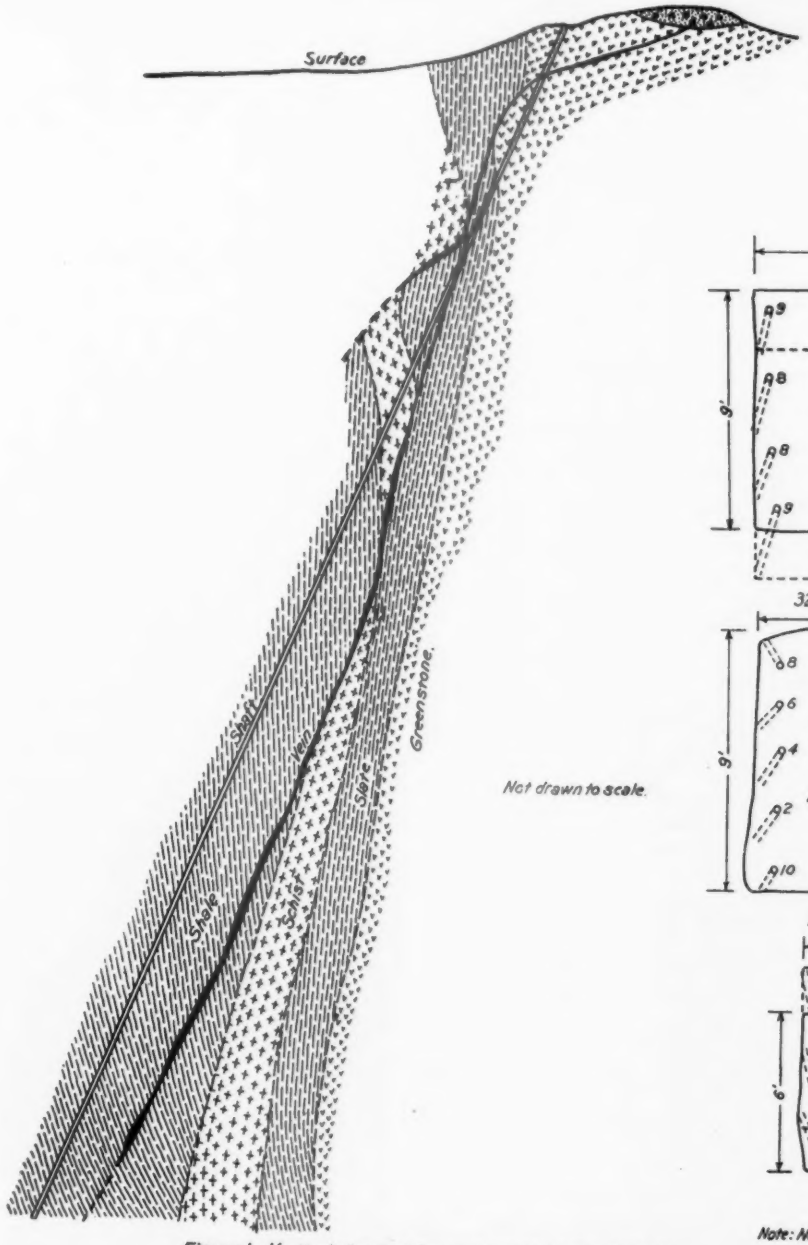
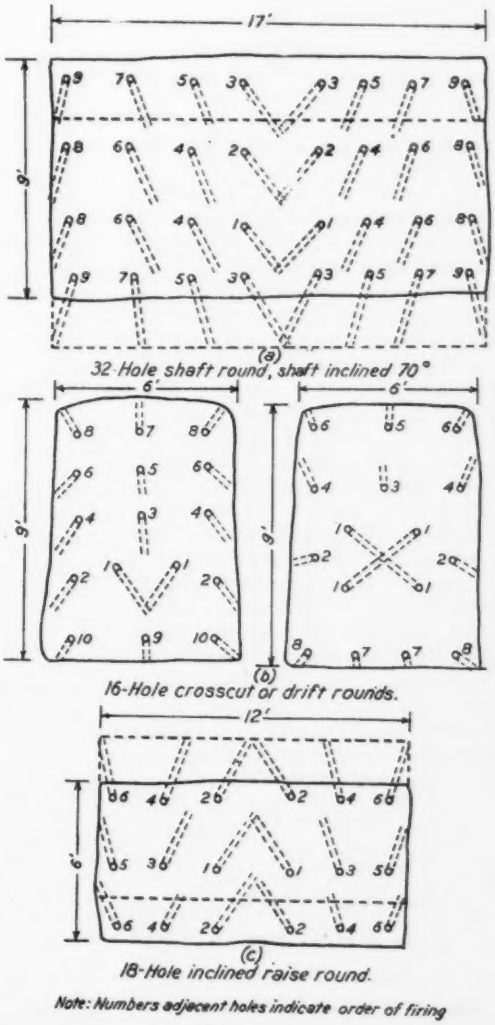


Figure 1:- Vertical sketch of Argonaut vein in relation to shaft



Note: Numbers adjacent holes indicate order of firing

Figure 2.

Exploration

As the ore shoot is very persistent and as no radical changes have so far been found in the nature of the ore body, exploration work is not a serious problem. Prior to the organization of the Argonaut Mining Co., exploration was confined to surface trenching and the driving of an adit to cut the vein at a depth of several hundred feet. The Argonaut Company explored the deeper portions of the ore body by sinking an inclined shaft in the hanging wall of the vein with crosscuts and drifts driven therefrom. Due to the heavy ground encountered, exploratory work can not be carried very far in advance of actual mining operations, as the maintenance expense entailed in keeping the workings open would become prohibitive.

Sampling and Estimating

Although the gold is not uniformly distributed in the ore shoot, close sampling is not necessary. One who is familiar with the ore can make a good estimate of the grade of the ore by visual inspection. When sulphides are present in the quartz the ore is invariably of good grade; the amount of sulphides, however, is not indicative of the richness of the ore.

Stope samples are taken by the trammers when the ore is drawn from the chutes. These samples, which consist of a handful of material from each car loaded, are thrown into a powder box near chute and are combined into one general chute sample, which at the end of each shift is brought to the surface for fire assay.

Development samples are taken in the same manner.

The areas stoped are platted monthly on a longitudinal section and a record is also kept of the tonnage and grade of the ore taken from each stope. From these records factors can be derived for estimating the grade and tonnage of any block which has been exposed on two or more sides. The ore body is fairly regular in its characteristics, and the factors, being derived from actual mining results, take account of dilution effects by waste rock. Consequently the grade factor and the tonnage factor (about 12.5 cu. ft. per ton for solid ore and 18 cu. ft. per ton for broken ore) both check closely in practice.

Development

Shaft

Entry to the mine is made by a 70 degree inclined three-compartment shaft 5,800 ft. long sunk in the country rock in the hanging wall of the vein (see *Figure 1*). The level interval is 100 ft. for the first 3,000 ft. from the surface and is 150 ft. from there to the bottom, measured on the incline. An auxiliary shaft is also maintained for ventilation purposes and for the escape of workmen in case of necessity.

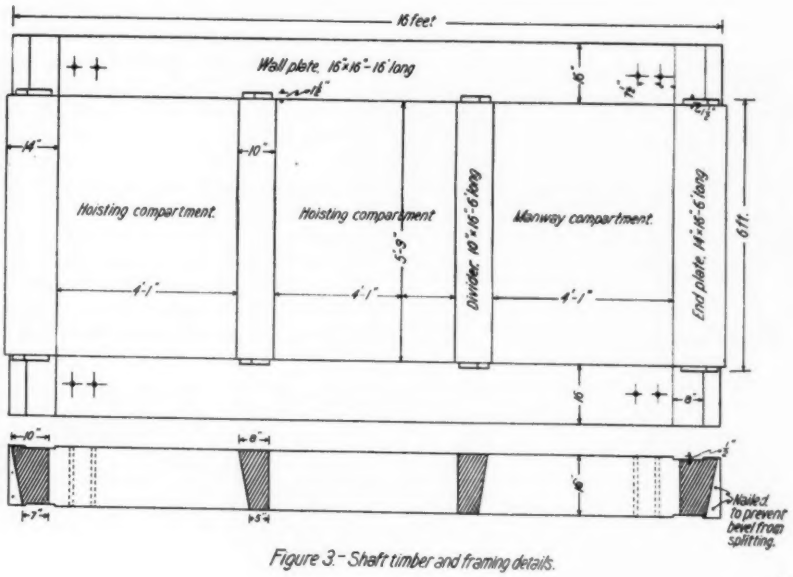


Figure 3.- Shaft timber and framing details.

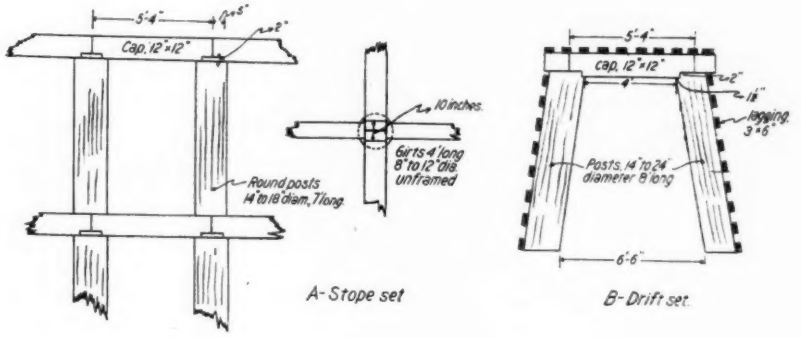


Figure 4.- Framing details

The main shaft is divided into one manway and two hoisting compartments; each compartment is 5 ft. 9 in. by 4 ft. 1 in. in the clear. The greater portion of the shaft is timbered with 20 by 20-in. Oregon fir sets, but the present practice is to use 16 by 16-in. wall plates 16 ft. long, 14 by 16-in. end plates 6 ft. long, 10 by 16-in. dividers 6 ft. long, and 8 by 12-in. posts 3 ft. 9 in. long. The sets are placed on 5-ft. centers. Lagging consists of 2 by 6 or 3 by 6-in. planks. Shaft sets are framed as shown in *Figure 3*. In this method of framing the strength of the timber is not weakened to any great extent, and the framing is simple compared to some of the more elaborate methods in use. The dovetails at the corners of the set which hold the set together while being blocked could be eliminated and the ends of the wall and end plates so framed that the outside edges of the end plates are flush with the ends of the wall plates. This would further simplify the framing, but the advantage gained would be lost in the extra time taken in blocking and wedging the sets in position. To prevent the bevel portion of dovetail from splitting, several spikes are driven into this part of the wall plates. In framing repair sets the dovetail is framed only on one end of each wall plate. Posts are used only at the four corners. Hanging bolts are used to draw the members of the set tightly into position.

Shaft timbers are framed on the surface by hand. Due to variation in the sizes of the timbers, all dimensions for cutting the mortises and tenons are marked on only one side of each timber. Uniformity in framing is obtained by the use of wooden templates.

Shaft sinking is done on contract with a guaranteed minimum wage. A crew of 12 men, or four men on each of the three shifts, is required. The routine

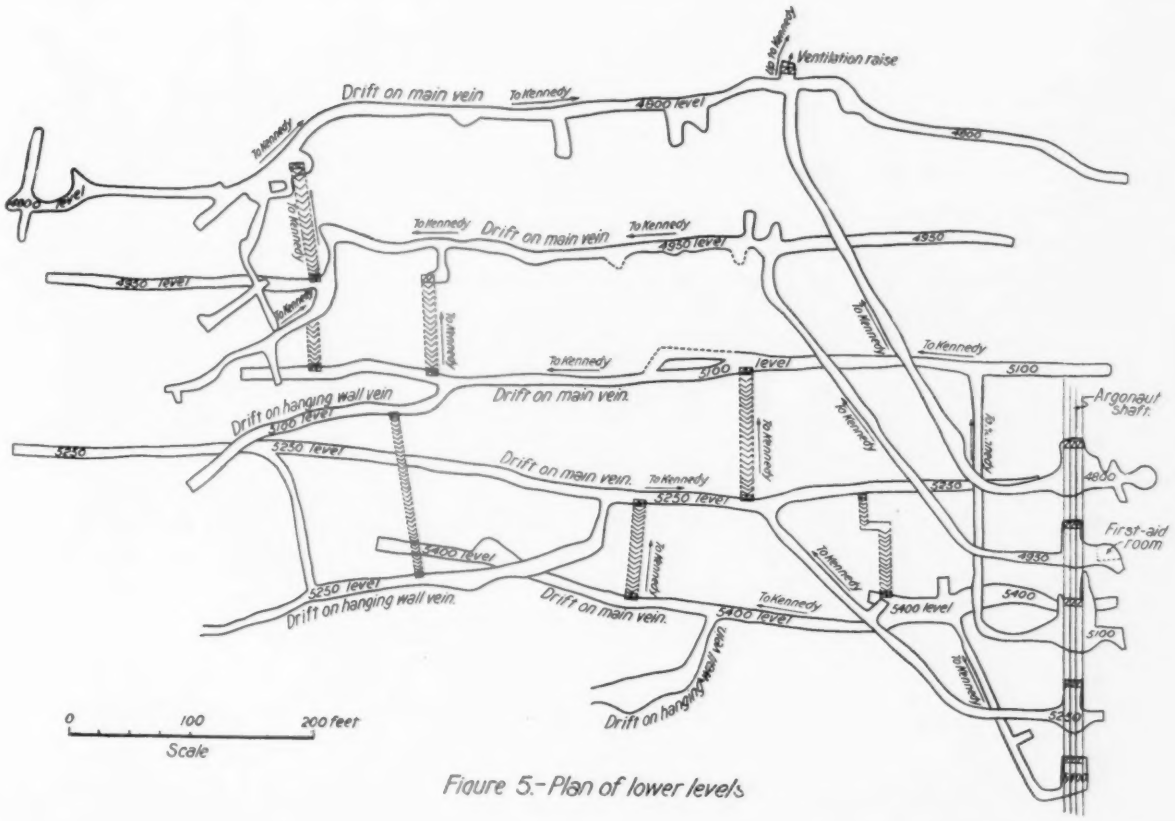


Figure 5.—Plan of lower levels

of operations in sinking a shaft is about as follows:

Operation	Time required
Drilling and blasting	1 shift
Shoveling	3 shifts
Placing one set of timber	1 shift

About 80 ft. of progress is made per month in sinking the main shaft.

Machines of the jackhammer type with 1-in. hollow hexagonal steel having the double taper cross bit are used in shaft sinking. The lengths of the steel and the corresponding bit gages are as follows:

Length, feet	Bit gage, inches
1½	2⅜
1½ to 3½	2⅛
3½ to 4½	2
4½ to 5½	1⅞
5½ to 6½	1¾
6½ to 8	1⅝

The average shaft round is drilled to a depth of about 5 ft. The holes are loaded with 40 percent strength gelatin dynamite. About 30 pounds of dynamite are required per foot of shaft. Rounds are fired by means of electric delay detonators connected with the mine lighting circuit of 110 volts. The 32-hole shaft round and the order of firing of the holes are shown in *Figure 2*.

The broken rock is shoveled by hand into a 1-ton skip, which runs on 16-pound rails placed to a gage of 27 in. Track for the sinking skip is placed in the manway compartment of the shaft and swung over to the center compartment below the bottom working level. With the sinking skip in the center of the shaft the broken rock can be shoveled into the skip from both sides. The shaft crew is protected from falling objects by a timber bulkhead placed below the bottom working level, and by 2-in. plank lagging nailed to the side of the manway compartment adjacent to the hoisting compartment.

A single-drum, compressed-air hoist is used for sinking. The broken rock is hoisted to the working level, which is used as a base for sinking operations. There the skip is dumped automatically. The rock passes through a spiral raise to the shaft waste pocket for hoisting to the surface.

A crew of four men with a shaft boss is steadily employed on one shift for repairing sets and easing heavy ground in the shaft.

Drifts and Crosscuts

Drifts and crosscuts are timbered heavily in order to withstand the pressure exerted by the heavy and sometimes swelling ground. The drift sets are framed with spreading posts and a single cap with lagging resting on the caps and behind the posts. The posts of a drift set consist of round timbers from 12 to 24 in. in diameter and 8 ft. in length. The batter of the posts is 2 in. per foot. Caps for the drift sets are 12 by 12-in. timbers 5 ft. 4 in. long. Girts are round timbers 8 to 12 in. in diameter. Drift sets are placed on 5-ft. centers. Lagging consists of 3 by 6-in. planks cut in 5-ft. lengths. No sills are used across the bottom for the posts to rest upon, as in swelling ground the bottom of a drift has, in some instances, raised as much as a foot per week. If sills were used in ground of this character, repairs to the drift sets would be more difficult and more expensive.

Experience has shown that attempts to lag swelling ground closely result in the bending or breaking of the lagging and in forcing the sets out of position. By leaving openings between the lagging the swelling ground "eases" itself to a certain extent by finding passage through the spaces. This method of lagging also admits of cutting away and removing encroaching ground, thereby preserving the main members of the sets in their proper position. *Figure 4-b* shows the framing details of the standard drift set used at the Argonaut mine.

Drifts and crosscuts are driven on company account. Two men comprise a drift crew. The two men shovel and tram the ore or rock and then run the drill. The character of the ground varies to such an extent that there is no definite routine of operations in advancing a heading.

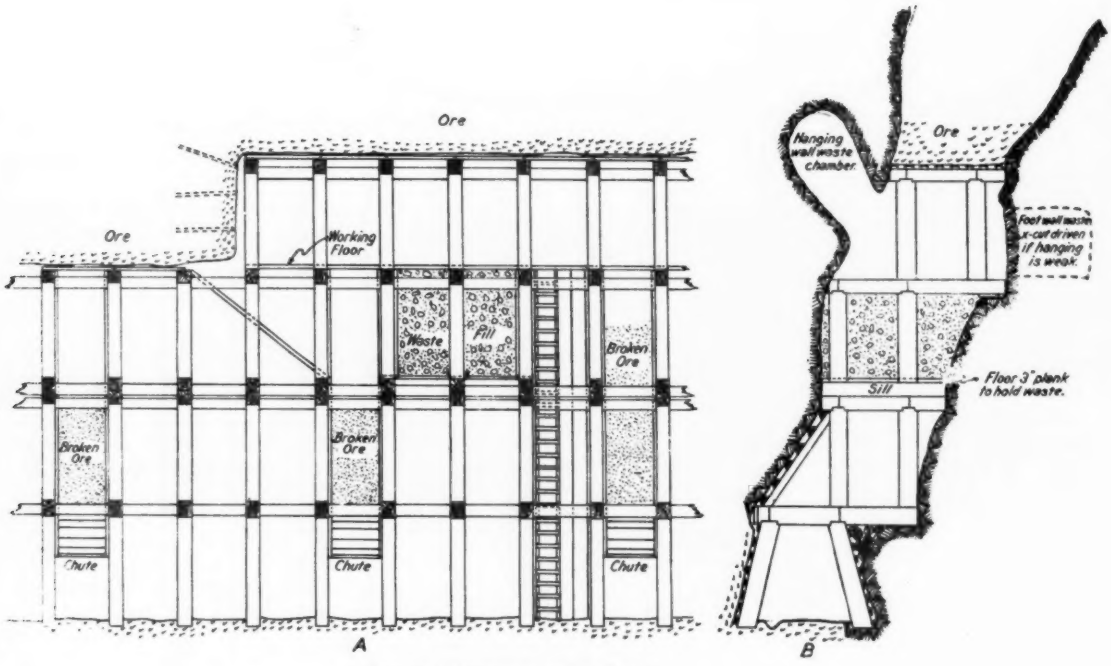


Figure 6,- Vertical sections of stope. A: Longitudinal section. B: Cross-section.

Machines of the Leyner type with 1-in. hexagonal steel are used for drilling, mounted either on a cross arm attached to a column or on a crossbar. The lengths of the steel and the bit gages are the same as those used in sinking operations. Rounds are drilled to a depth of 5 ft. Holes are loaded with 30 percent strength gelatin dynamite and detonated with No. 6 caps and triple-tape fuse. The types of drift and crosscut rounds are shown in *Figure 2-b*.

The broken rock is shoveled into 1-ton cars and trammed to the shaft pocket or to the nearest dumping place underground.

Raises

Raises are also driven on company account by a crew of two men working together. Raises are driven on the footwall side of the vein and consist of two compartments, a chute and a manway, requiring an opening 6 by 12 ft. in the clear. Raise timbering in heavy ground consists of round posts 5 ft. long and 14 to 18 in. in diameter, 12 by 12-in. caps 5 ft. 4 in. long, and round girts 8 to 12 in. in diameter and 4 ft. long. In places where the ground stands well the raises are timbered with stulls and posts. With this method of timbering, a hitch is cut in the footwall to receive one end of the stull; the other end is blocked to the solid with a headboard and the ends of two consecutive stulls are separated by a post. The framing details for the raise square-sets are the same as those used in the stope sets shown in *Figure 4-a*.

A ladder and timber slide are placed in the manway compartment of each raise. Supplies are hoisted in the raises either by hand or small tugger hoists. The chute is lagged off from the manway with 2 by 12-in. planks.

The routine of operations in driving a raise is about as follows:

First shift

Operation	Time, hours
Preparing to drill	1
Drilling	5
Tearing down	½
Loading and blasting	1

Second shift

Operation	Time, hours
Barring down and cutting hitches	2
Hoisting timbers	1
Timbering	4½

Hand-rotated stoper machines are used in drilling. The steel used is 1-in. hexagonal solid with the double-taper cross bit. The changes and bit gages are as follows:

Length, feet	Bit gage, inches
1½	2⅛
1½ to 3½	2
3½ to 4½	1⅞
4½ to 5½	1¾
5½ to 6½	1⅝
6½ to 8	1½

The usual raise round comprises 18 holes drilled to a depth of 5 ft. This round is shown in *Figure 2-c*. Rounds are blasted with 30 percent strength gelatin dynamite and No. 6 detonators with triple-tape fuse.

MINING

The method of stoping employed at the Argonaut mine is an adaptation of the square-set system and is followed closely by waste filling.

In developing the ore body preparatory to mining, a crosscut is driven from the main shaft station to the vein. From the crosscut drifts are extended along the footwall. Crosscuts and drifts, 6 by 8 ft. in cross section, are timbered with the regular drift sets, and the timber is placed in position close to the working face at all times. When the drift has been extended several hundred feet a raise is driven to connect with the level above. The primary purposes in driving this raise are to afford an additional exit for the workmen in case of necessity and to improve air circulation on the level. A plan of the lower levels is shown in *Figure 5*.

Silling-out for stoping is done at the top of the first floor above the drift sets. Regular stope sets are used for timbering above the drift, as shown in *Figure 6*. The reason for silling-out in this manner instead of on the level is that the drifts are easier to repair and keep open. The pressure from the walls acting on the sills is sufficient to hold the sills securely in position, so that they will carry the weight of the waste filling if it is necessary to remove a drift set temporarily for repairs or replacement.

In some cases instead of placing the regular stope sets directly above the drift sets a system of long caps on stringers is used to support the stope filling, as shown in *Figure 7*. The blocks for car-

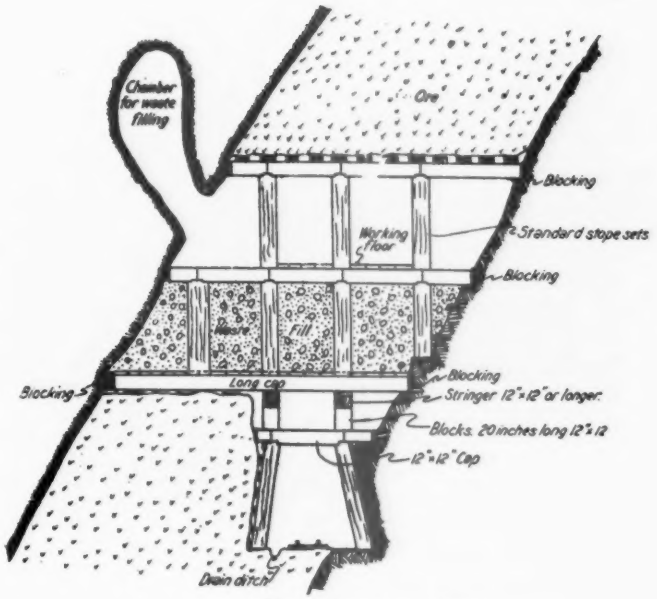


Figure 7.- Vertical section of stope.

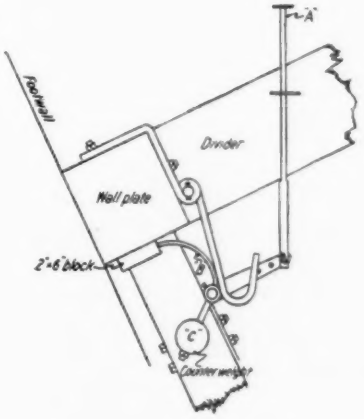


Figure 8.- Skip chair

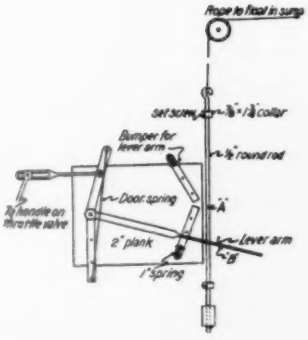


Figure 9.- Automatic control for air-driven pump

rying the stringers are placed on the drift-set caps in line with the posts. Stringers are laid on these blocks parallel with the strike of the vein; the stringers in turn support the long caps, which extend from wall to wall and are held in position by headboards and wedges. Upon the long caps the stope flooring is laid for holding the waste filling. Above the flooring a change is made to the regular stope sets.

Stoping is carried upward in sections about 100 ft. long, or as long as the distance between two consecutive manways, which is usually about 100 ft. Several sections are usually mined at the same time, as one section is several sets lower than the adjoining section. Practically all the vein material in the ore shoot is mined without sorting. No pillars are left.

Due to the conditions that arise in mining in such heavy ground, the manner of removing the ore is varied according to the mine foreman's judgment. Generally only enough ground is removed at a time for standing one set of timber. After a section has been mined one set high across the width of the vein and the length of the 100-ft. section another floor is started. Filling with waste is carried on contemporaneously with stoping so that only one floor is open at a time.

Plank floors are carried upward as the stope advances, usually one set below the back of the stope.

Manways are carried up as the stope advances. The gob is held in position at the ends of a section with 2 by 3-in. planks nailed to the sides of the raises adjacent to the waste.

Chutes for drawing ore from the stopes are built in every fifth drift set or at intervals of 25 ft. The ore breaks fine enough in blasting so that it can be drawn from the chutes very readily without hanging up. When possible, the ore is diverted into the chutes by wings built of plank in the square-sets. The ore that can not run by gravity into the chutes is shoveled by hand.

Stope Timbering

The posts for the stope sets are framed at only one end with a rectangular tenon 10 by 12 in. and 2 in. high. The posts are round timbers 14 to 18 in. in diameter and 7 ft. in length over-all. Caps are 12 by 12 in. and 5 ft. 4 in. long. Girts are 8 to 12 in. in diameter and 4 ft. in length, unframed. A square-set is 7 ft. 10 in. high and 5 ft. 4 in. by 5 ft. in cross section (center to center of posts). A standard set contains 209 cu. ft., or 16.72 tons of ore. *Figure 4-b* shows the method of framing the square-sets.

The caps are so framed that their ends meet on top of the posts to afford the maximum bearing area in line with the maximum pressure. Posts are unframed at their lower ends. With this style of framing there is very little "give," if the sets are properly blocked, thus preventing ground movement. If the ground once once begins to move it is difficult, expensive, and dangerous to support it. At the Argonaut mine compressive force is exerted both from the weight of the ore overhead and from the walls, so that it is sometimes necessary to put in supplementary angle braces to prevent the sets from "riding." The pressure generally shifts from one place to another as stoping progresses, and for this reason the filling of the stopes contemporaneously with mining is imperative. If the extraction of ore were not followed closely by waste filling, the pressure acting in one plane would force a row of sets out of alignment and consequently weaken the remaining sets, resulting in the ultimate collapse of the stope.

Filling

Filling is obtained by driving inclined chambers into the hanging wall, or, if the hanging wall is weak and has a tendency to cave, filling is supplied by driving crosscuts into the footwall. The waste is run into the stopes as much as possible by gravity and the final leveling off of the fill is done by hand.

Drilling and Blasting

Machines used in stoping are of the Leyner type, using the 1-in. hollow hexagonal steel. The changes in steel lengths and bit gages are the same as those given in the section on shaft sinking. No standard round is employed in stoping, as the character of the ground varies considerably. For the same rea-

son no routine of operations in stoping can be given.

Most of the ore breaks fairly fine; any large bowlders are broken in the stopes with hand hammers. Grizzlies constructed of old rails are placed over the ore chutes in all the stopes.

Blasting is done with No. 6 detonators, triple-tape fuse, and 30 percent strength gelatin dynamite.

Underground Transportation

All ore and rock is trammed underground by hand in 1-ton end-dump cars equipped with roller bearings and cast-steel wheels 12 in. in diameter. The distance from the shaft to the ore body is not great enough to make mechanical haulage profitable. In addition, locomotives would be subject to very severe usage because of the difficulty in maintaining a uniform grade on the track in swelling ground. The average tramming distance on the bottom working level (5,400-ft. level) is about 500 ft. Track consists of 16-pound rails laid to a gage of 18 in. An attempt is made to maintain a track grade of about three-fourths percent. Ties are 4 by 6-in., timbers 3 ft. long spaced on 30-in. centers.

The ore is dumped into shaft pockets having a capacity of about 200 tons. Grizzlies over the shaft pockets are constructed of 40-pound rails with 8-in. openings between the rails.

Hoisting

Hoisting is done in balance with self-dumping skips having a nominal capacity of 72 cu. ft., or 4 tons; the average amount of ore hoisted per skip is 7,100 pounds. The skips are equipped with 12-in. cast-steel wheels and roller bearings. The wheels have extra wide flanges to prevent derailing. Track in the shaft is of 40-pound rails laid to a gage of 30 in. The rails are spiked to stringers secured to the footwall wall plates.

The flow of ore into the skips from the shaft pockets is controlled by hand-operated rack and pinion gates. The skip is held stationary in the shaft when being loaded by means of a hook attached to the footwall timber (*Figure 8*). The hook is raised to engage the front axle of the skip by means of the lever, A. By bearing down on the lever, A, the curved arm, B, raises the hook so as to engage the skip axle. When the weight is taken off the hook by raising the skip, the counterweight, C, brings the hook to the position shown in the sketch.

The hoist is situated on the hanging-wall side of the vein, and from the drum centers to headframe sheaves the distance is 300 ft. The slack in the hoisting rope is taken care of by three sets of idler sheaves. The hoist is geared; the pinion has 22 teeth and the spur wheel 108 teeth with 3-in. pitch. The diameters of the gears are 21 and 108 in., respectively. The drums are 8 ft. in diameter with 47-in. faces, and they carry 10 layers of 1⅛-in. diameter, 6 strand 19 wires, hemp-core crucible-steel hoisting ropes. There is a post brake on each drum flange and also brakes on two flywheels on the pinion shaft. Clutches are operated by hand levers.

The hoist is driven by a 500 hp., 440 volt, 60 cycle, 3-phase, 440 r. p. m. at full load, induction motor. On the motor shaft is a 42-in. diameter pulley grooved for 20 turns of 1¼-in. hemp rope. The driving pulley on the hoist pinion shaft is 94 in. in diameter. The transmission rope drive is endless in two sections running over 10 grooves each. Each rope is 1,600 ft. long and has a tension pulley arrangement mounted on a frame above. A transmission rope lasts from 14 to 18 months.

The motor is controlled by a master switch and liquid rheostat. The hoist is equipped with overwind and overspeed devices. The maximum hoisting speed is about 900 ft. per minute.

For several years prior to 1919, hoisting in stages was employed. The second hoisting plant was installed on the 3,900-ft. level. At a comparatively small plant like the Argonaut the extra expense of employing three additional hoisting engineers and three skip-tenders, as well as the increased cost of power, is felt, and in consequence stage hoisting was discontinued after 1919. The present hoisting plant has reached the limit of its capacity (5,800 ft. inclined distance) and when sinking is resumed, the plan is to install a new hoist

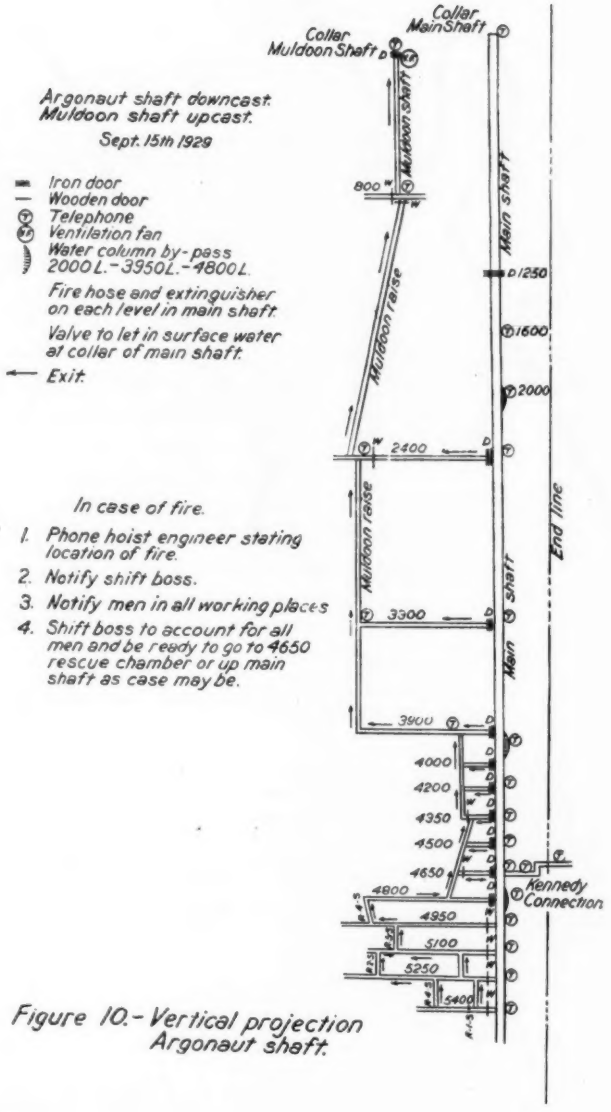


Figure 10.- Vertical projection Argonaut shaft.

TABLE 1—SUMMARY OF COSTS

Argonaut mine — Month of September, 1929
Tons of ore hoisted: 7,800 — Mining method: Square-set and fill

	Underground costs per ton of ore							
	Labor	Supervision	Drills and steel	Power	Explosives	Timber	Other supplies	Total
Development	0.139	.....	.....	0.011	0.011	0.001	0.003	0.165
Mining	1.746	0.052	0.013	0.088	0.148	0.335	0.057	2.439
Hoisting	0.253	.....	.....	0.109	.....	.....	0.157	0.519
General underground expense	0.387	0.104	.....	0.041	.....	.....	0.045	0.577
General surface expense	0.201	.....	.....	0.047	.....	0.002	0.041	0.291
Total	2.726	0.156	0.013	0.296	0.159	0.338	0.303	3.991

Note: Above costs are direct costs only.

TABLE 2—SUMMARY OF COSTS IN UNITS OF LABOR, POWER, AND SUPPLIES

Argonaut mine — Month of September, 1929
Tons of ore hoisted: 7,800 — Mining method: Square-set and fill

A. Labor (man-hours per ton):			
Development			0.296
Ore breaking and timbering			2.054
Waste breaking and filling			0.347
Ore tramming			0.329
Ore shoveling			0.475
Pumping (underground)			0.092
Shaft maintenance			0.185
General mine maintenance			0.205
Supervision			0.185
Total			4.168
Tons per man per shift underground			1.92
B. Power and supplies:			
Power (total kw. h. per ton)			33.08
Hoisting	9.90		
Air compression	9.02		
Pumping (underground)	6.40		
Ventilation	2.11		
Sawmill	3.81		
Shops	1.45		
Lighting	0.39		
Total	33.08		
Timber (sawed stock bd. ft. per ton)			7.05
(round timber lin. ft. per ton)			1.08
Poles 6 to 10 in. diam.	0.45	lin. ft. per ton	
Poles 11 to 14 in. diam.	0.40	lin. ft. per ton	
Poles 15 to 18 in. diam.	0.18	lin. ft. per ton	
Poles 19 to 24 in. diam.	0.05	lin. ft. per ton	
Total	1.08	lin. ft. per ton	
Explosives (size 1 by 8 in. 30 percent gel.):			
Sticks per ton			2.75
Pounds per ton			1.01
Other supplies in percentage of total power and supplies			28.5
C. Labor percent of total cost			72.2
Power and supplies percent of total cost			27.8

with 10-ft. drums and 1⅜-in. rope. With this equipment it is estimated that sinking can progress to 7,500 ft. inclined distance, and that the ore can be hoisted to the surface in one lift.

Wage Scale

About 30 percent of the underground employes are Mexicans, 10 percent of various European nationalities, and 60 percent Americans. The wage scale as of November, 1929, was as follows:

	Wage per day
Engineer (surface)	$6.25
Engineer (sinking)	4.75
Miner	4.50
Mucker	4.00
Pipeman	4.50
Pumpman	4.50
Shaftman (repair)	5.00
Shaftman (sinking)	6.00
Skiptender	5.25
Timberman	4.75
Tool nipper	4.50
Topman	4.00
Trackman	4.75
Trammer	4.25

All underground work, with the exception of shaft-sinking, is done on company account. In shaft-sinking the rate paid for a 9 by 17-ft. shaft is $45 per linear foot of completed shaft. All tools, timber, explosives, and other supplies are furnished by the company.

Ventilation

The mine is mechanically ventilated by a 50,000 cu. ft. fan, 4 ft. in diameter by 3 ft. in width, located at the collar of the auxiliary shaft. (See *Figure 10*, which shows diagramatically the course of the ventilating currents in the mine.) The fan is belt-driven by a 100-hp., 440-volt, 3-phase, 60-cycle, 575 r. p. m. motor. The water-gage pressure when the fan is in operation is 2½ in.

The fan normally exhausts, but can be reversed. In tests the mine air currents have been reversed in six minutes. The fan is so installed at the collar of the shaft that the shaft entrance can be used in case of need for rescue or other purposes.

Mine Pumping

About 72,000 gallons of water per 24 hours, or an average of 50 gallons per minute, are pumped from the mine. The water is collected on the lower levels and pumped to the main sump for raising to the surface by means of three duplex inside-packed, air-actuated pumps. The pumps are installed at intervals of 300 ft., incline distance; one pump is on each of the following levels—4,800, 5,100, and 5,400. Each air pump is automatically controlled by a mechanism operated by means of a float in the sump. This automatic control is shown in *Figure 9*. A float in the sump lifts or lowers the rod, A. Adjustable collars on the rod engage the lever arm, B, and the movement of the lever is transmitted by a toggle to the air valve in the pipe line leading to the pump.

The water is pumped to the surface from the 4,800 level in three lifts by three 3-stage turbines, one on each of the 4,800, 3,900, and 2,000 levels. Each turbine is direct connected to a 75-hp., 2,200-volt, alternating-current motor.

Safety Methods

The timber used in mining presents a fire hazard. This hazard is reduced by precautionary measures taken for the protection of the men underground and of property.

Employes are organized for fire prevention, fire control, and rescue of men underground. A plan of action to be followed in the event of a mine fire is posted in conspicuous places underground (see *Figure 10*). The sketch accompanying the plan of action shows the location of the emergency exits, telephones, air bulkheads, fire doors, direction of air currents and location of refuge places.

The main shaft is regularly inspected for conditions tending to increase the fire hazard. The second exit from the mine is also inspected at least once a month.

At each 100 ft. in the shaft manway a 50-ft. length of hose is kept which is attached to a high-pressure water line. Fire extinguishers of the soda-acid type are also kept in good condition at the same intervals in the shaft. Fire extinguishers are placed at various points underground where they are readily accessible.

Bulkheads of gas-tight material are in place throughout the mine to prevent smoke or gases from cutting off the escape of the men underground.

Mine air currents are positively controlled by the fan located at the collar of the second exit from the mine.

Five sets of approved oxygen breathing apparatus are maintained in good working order on the surface. The apparatus crew renews training at least once each month.

Telephone lines are arranged to provide two means of communication between each working level and the surface, and at the other points in the main shaft and second exit.

A door is provided at the connection between the Argonaut mine and the adjoining property at the 4,650 level. Compressed-air and telephone lines are run from each mine to each side of the door.

U. S. Oil Policy Is Held Valid

President Hoover's Government oil conservation policy and the steps taken to enforce it, were sustained by the District of Columbia Court of Appeals December 1.

In a majority opinion, the court upheld as a valid exercise of Executive power an order by Secretary Wilbur rejecting all applications for permission to prospect for oil on the public domain.

The President's policy was enunciated in a brief informal statement to newspapermen, a few days after his inauguration, and Wilbur's order was issued immediately thereafter.

Justice Josiah van Orsdel dissented from the court's majority opinion and held the policy could have been made effective only upon the issuance of a former presidential proclamation.

The decision was based on an opinion of the Supreme Court, which held in the Mid-West Oil case that the President could make temporary withdrawals of public land without formal proclamation.

The case in question was brought by Roy G. Barton, who filed an application for a prospecting permit at Las Cruces, N. Mex.

Commenting on the decision, Secretary Wilbur said: "The Administration's conservation policy will continue to be strictly enforced and the Government oil lands will continue to receive full protection. The action of the Court of Appeals, taken as the result of the department's appeal from adverse decisions in the District Supreme Court, will be an effective aid to the department's consistent drive for wise use of the Nation's oil resources."

War Minerals Claimant Wins Decision Against U. S.

David Halstead, of Philadelphia, receiver of the American Manganese Manufacturing Company, won a victory against J. R. McCarl, Comptroller General of the United States, when the Court of Appeals of the District of Columbia on December 1 unanimously affirmed a mandamus order of the Supreme Court of the District directing the Comptroller General to pay to him, as receiver, $97,139.50, with interest from December 9, 1925.

The sum ordered to be paid represented an award made by the Secretary of the Interior pursuant to the War Minerals Relief Act, the company having sustained huge losses in the production of manganese during the war. The Comptroller General, however, refused to pay the award, claiming that the company was indebted to the United States Government for a tax claim of approximately $236,000.

The Court of Appeals of the District of Columbia held that the tax claim was outlawed and that all claims must be presented to the receiver and dealt with by him pursuant to the order of the Court of Common Pleas, which court appointed David Halstead receiver.

J. C. Howard Killed By Fall In Salt Lake City

John C. Howard, president and general manager of the Utah Oil Refining Company and a director of the Midwest Refining Company, died in Salt Lake City, Utah, December 18 from injuries suffered in a six-story fall to the marble floor of the Newhouse Building there earlier in the evening, according to an Associated Press dispatch.

Mr. Howard, who was widely known in this region, is believed to have fainted just before he toppled over a bannister on the seventh floor of the building. Business associates with whom he had been conferring a short time before his fall, said he had complained during the day of pains around his heart.

Mr. Howard was 51 years old. He was the founder of the Utah Oil Refining Company, one of the largest refiners and distributors of crude oil and its products between the Rocky Mountains and the Pacific coast. Mr. Howard had been president of the company since 1912.

Four Tri-State Operations Go 11 Months Without Accident

Three mines and one tailing mill in the Tri-State District have worked through the first 11 months of 1930 without a lost-time accident. The three mines, the Scammon Hill, West Side and Wilbur, belong to the Commerce Mining and Royalty Company. The tailing mill is the No. 3 plant of the St. Louis Mining and Smelting Company.

Thirty-two mines and mills worked through the month of November without a lost-time accident, according to records of the accident prevention department of the Tri-State Zinc and Lead Ore Producers' Association.

Geo. H. Rupp Heads Mining Congress Standards Committee

Geo. H. Rupp, general manager of mines of the Colorado Fuel and Iron Company, has accepted appointment as chairman of the Sectional Committee M-18, 1928, of the American Standards Association, sponsored by the American Mining Congress, Underground Transportation in Metal Mines.

The existing tentative American standard on this subject, which is the result of early committee study, is to be revised and enlarged. To do this Mr. Rupp plans to reorganize the committee, making it representative of all metal mining regions of the country and other interests entitled to participation.

Mining Institute at University of Washington, January 19-25

The College of Mines, University of Washington, Seattle, Wash., announces that its third annual mining institute will be held during the week of January 19 to 25, 1931. The sessions will be held in Mines Laboratory and are open to all persons interested in any phase of the mining, metallurgical, or ceramic industries. No fees are charged for entrance. Last year 240 persons attended the various meetings.

The schedule of lectures, laboratory exercises, field trips and demonstrations completely occupies the full week. Fuller details of the program will be announced later; in the meantime, tentative announcement is made that speakers from the mining industry will discuss gold mining and milling, the mining of mercury, safety in mining, development of local manganese deposits, utilization of non-metallics, etc. Members of the faculty of the College of Mines will, as usual, give lectures covering their special fields of activity.

Interested persons may receive further information by writing to the dean, College of Mines, University of Washington, Seattle.

State Mine Chiefs Confer On Safety Program

The chiefs of the departments of mines of eight coal-producing states conferred with a committee of coal operators of the National Coal Association in Washington, December 5, to formulate an accident-prevention program. Safety institutes in every producing field and a nation-wide exchange of information were suggested, among numerous other plans which will be thrashed out at a meeting of the safety committee, to be held in Chicago, January 15, where a definite program will be shaped, and will be presented to a committee representing the mine chiefs at a Washington meeting in late January. The chief executive of the Portland Cement Association, whose headquarters are in Chicago, will detail to the committee of the National the successful safety program of the cement interests.

The following state officials, along with Dan Harrington, chief safety engineer of the U. S. Bureau of Mines, were present: Wm. Boncer, Richmond, Va.; John F. Daniel, Lexington, Ky.; Albert C. Dally, Indianapolis, Ind.; Walter H. Glasgow, Harrisburg, Pa.; W. B. Hillhouse, Birmingham, Ala.; John G. Millhouse, Springfield, Ill.; J. J. Rutledge, Baltimore, Md., and E. W. Smith, Columbus, Ohio.

The following operators attended the conference: Milton H. Fies (chairman), DeBardeleben Coal Corp., Birmingham, Ala.; C. W. Connor, American Rolling Mill Co., Ashland, Ky.; R. V. Clay, Hanna Coal Co., Cleveland, Ohio; George Dunglinson, Jr., Fuel Dept., Norfolk & Western Railway, Bluefield, W. Va.; W. B. Lewis, Oakdale Coal Co., Denver, Colo., and Lee Long, Clinchfield Coal Corp., Dante, Va.

Phelps Dodge Branches Make Safety Records

Two new records were established in the safety contest of the five Phelps Dodge Corporation branches during November, according to the Copper Queen labor department.

But four accidents were recorded among the five branches during the 30-day period, a new all-time minimum low since the contest was inaugurated several years ago, and three of the five branches turned in perfect records for the month, the first time since the contest started that more than two branches have achieved perfect records for a month's period.

The Morenci, Moctezuma and Old Dominion branches each reported no time lost accidents in any department for the month. The Copper Queen branch and the Stag Canon branch each reported two time lost accidents in November.

Three of the four accidents occurred in the underground mining department. Both accidents chalked up against the Stag Canon branch occurred in this division and one of the two reported by the Copper Queen. The other accident of the Copper Queen occurred in the smelter department.

But 83 accidents have been chalked up against the five branches during the last 11 months. The Morenci branch shows a score of 10 time lost accidents for the year to date, the Old Dominion 12, Stag Canon 15, Moctezuma 18, and the Copper Queen 28.

Figured on the basis of 1,000 shifts worked, the Morenci branch has the highest average for the year to date with .027. The Moctezuma is in second place with .041, the Copper Queen third with .044, Old Dominion fourth with .053 and the Stag Canon fifth with .153.

James C. Roberts Dies

James C. Roberts, secretary of the Denver Safety Council and widely known mining man in the West, died at his home at Golden, Colo., November 25, of complications resulting from pneumonia.

Mr. Roberts came to Denver as chemist for the old Globe smelter after his graduation from North Carolina University, which was followed by a post-graduate course at Columbia. Later he was chief metallurgist for the Anaconda Copper Company and professor of metallurgy at Colorado School of Mines.

He was for several years in charge of the safety work with the United States Bureau of Mines and resigned to return to Colorado mines as professor of safety engineering and efficiency and coal mining. He has been secretary of the Denver safety council for the last five years, and was president of the Denver chapter of the American Institute of Mining Engineers.

United Verde Ex. To Sink Shaft At Vulture Property

The United Verde Extension Mining Company, of Jerome, Ariz., has let a contract for sinking of a 500-ft., three-compartment shaft on the Vultura property at Wickenburg, Ariz., according to reports. Camp facilities are rapidly being put in shape for an extensive program of development. About 30 men are employed in rebuilding the camp. New houses are being built for the miners, old buildings are being rehabilitated, and new equipment installed to speed sinking of the shaft. Foundations are at present being constructed for placing of the compressor and hoisting plant. It is understood that the mill on the property may later be reconditioned. This work is being carried out under the supervision of D. R. Finlayson, manager of the Vultura Mining & Milling Company, the former operators.

Old Dominion Company Buys Arizona Commercial

Old Dominion Company has acquired the adjoining property of Arizona Commercial Mining Company, at Globe, Ariz., at a price reported to be about $20,000. Ore reserves of the latter company, it is said, have been virtually exhausted so far as present knowledge of the mine is concerned, and the purchase was made, it is understood, largely on the basis of salvage value of the equipment.

Reports state that Old Dominion will connect its workings underground with the Arizona Commercial. The entire water flow will then be pumped out through the O. D. shaft. Better ventilation will also be made available through the connection of the two mines, and Old Dominion may be able to extract some of the low-grade copper material left in the Arizona Commercial workings.

Bancroft Gherardi New President of Standards Association

The election of Bancroft Gherardi, vice president and chief engineer of the American Telephone and Telegraph Company, to the presidency of the American Standards Association was announced at the annual meeting of the association at the Hotel Astor, New York, December 11. Mr. Gherardi, who has been a member of the association's board of directors, will assume the direction of the national and international standardization activities of the organization, a task in which over 2,000 representatives of about 500 national trade, technical, and governmental bodies are engaged under American Standards Association auspices. The American Mining Congress clears its standards through the American Standards Association. Mr. Gherardi has been affiliated with the American Telephone and Telegraph Company since 1907, and has been vice president and chief engineer since 1920. He is past president of the American Institute of Electrical Engineers, and has also served as president of the United Engineering Society.

Cloyd M. Chapman, engineering specialist of New York City, was reelected to the vice presidency of the association for the year 1931. Mr. Chapman entered the employ of Thomas A. Edison in 1899 as assistant in his private laboratory on experimental work. He has been engineer for Westinghouse,

Church, Kerr and Company in charge of design and construction work and as engineer of tests. His work has included the design and construction of a number of important central stations and industrial plants.

The Board of Directors of the association for the next year will include: Quincy Bent, vice president, Bethlehem Steel Company; George K. Burgess, director, United States Bureau of Standards; Cloyd M. Chapman, consulting engineer; C. L. Collens, president, Reliance Electric & Enginering Co.; Howard Coonley, president, Walworth Company; L. A. Downs, president, Illinois Central Railroad; F. E. Moskovics, president, Improved Products Corporation; W. J. Serrill, the United Gas Improvement Company; M. S. Sloan, president, New York Edison Co., and Affiliated Companies; R. J. Sullivan, vice president, Travelers Insurance Company.

Mr. Gherardi succeeds in the presidency William J. Serrill, of the United Gas Improvement Company, of Philadelphia, who has held this office since 1928.

In his report covering the work of the association during the past year, Mr. Serrill mentioned among the high spots of the year:

Completion of 46 new national standards in the fields of mechanical, civil, chemical, and electrical engineering and in mining, woodworking, and a number of other industries. These include a number of safety codes which are being used by regulatory bodies, insurance groups, and industry as the basis for nationally uniform methods of safeguarding the lives and health of workers.

Rupp Appointed Manager of C. F. & I., Mining Division

Geo. H. Rupp has been appointed manager of the newly created mining department of the Colorado Fuel & Iron Company. He will have charge of all iron mine, coal mine and quarrying operations.

Mr. Rupp heretofore has been in charge of iron mines and quarries, having come with the Colorado Fuel & Iron Company in this capacity early in 1929. Before joining C. F. & I., he was with the Calumet and Hecla Consolidated Copper Company, at Calumet, Mich.

He attended the University of Michigan, graduating from the Michigan College of Mines in 1911. After building county roads in Michigan he was associated with the Schlesinger mining interests and was efficiency engineer at the Newport mines.

Mr. Rupp later engaged in exploration work and was active in the development of the Townsite Mining Company. Disposing of his private interests several years later, he was later with the Ford Motor Company as superintendent of the Imperial mines at Michigamme, Mich.

L. D. Anderson Leaves for Russia

L. D. Anderson, chief engineer for the United States Smelting, Refining and Mining Company, left for Russia recently, where he will supervise the erection of steel mills and blast furnaces.

Mr. Anderson, who is being retained as consulting engineer of the Freyn Engineering Company, of Chicago, entered the service of the U. S. Smelting Company in 1906 and was superintendent of the Midvale smelter, manager of smelters and consulting engineer.

W. A. Richards Heads Williamson Operators

The eighteenth annual meeting of the Operators' Association of Williamson Field was held in Williamson, W. Va., November 25 with an exceptionally large attendance. At the business meeting in the afternoon President L. E. Woods presided and presented an excellent report of the Executive Committee. Mr. Woods advised that the Executive Committee had authorized the president to name a committee to consider the advisability of an enlarged system of cost reports and that this committee would consult with Allan H. Willett, director of the Bureau of Coal Economics of the National Coal Association. The report of W. S. Leckie, the treasurer, showed that the association was in sound financial condition. Reports of the Freight Rate Committee, the Bureau of Coal Statistics and the Trade Practice Bureau were made by Messrs. George S. Patterson, S. W. Patterson and M. W. Stark, respectively. There was considerable discussion as to ways and means by which slack might be stored and the committee on that subject was directed to continue its investigation. Consideration was also given to development of mine safety measures in the Williamson field and a committee will be named to formulate a safety program.

These officers were elected: President, W. A. Richards, president, Majestic Collieries Co., Bluefield, W. Va.; vice president, M. W. Stark, vice president, Red Jacket Consolidated Coal & Coke Co., Columbus, Ohio; treasurer, W. S. Leckie, general manager, Leckie Collieries Co., Columbus, Ohio; secretary, Joseph J. Ardigo.

The Board of Directors is composed of the president, vice president, treasurer, and the following operators: Geo. W. Coffey, president, War Eagle Coal Co., War Eagle, W. Va.; Geo. Dunglinson, Jr., manager, fuel department, Norfolk & Western Ry. Co., Bluefield, W. Va.; L. D. Heustis, general manager, Portsmouth By-Product Coke Co., Portsmouth, Ohio; T. H. Huddy, general manager, Sudduth Fuel Co., Williamson, W. Va.; W. E. Pritchard, president, William Ann Coal Co., Huntington, W. Va.; John L. Tierney, president, Sharon Coal & Coke Co., Sharondale, Ky.; L. E. Woods, president, Crystal Block Coal & Coke Co., Huntington, W. Va.

George S. Patterson presided as the toastmaster at the dinner held in the evening at the Mountaineer Hotel, at which addresses were made by Vice President W. J. Jenks, of the Norfolk and Western Railway Company; Charles Milton Newcomb and Executive Secretary Huntress, of the National Coal Association. Mr. Jenks pledged the continued support of his railroad to the industry in the Williamson Field and cited the extensive improvements that were being made by that railroad in preparation for the revival of business which he predicted was not far distant.

T. G. Fear Heads West Virginia Coal Mining Institute

The twenty-third annual meeting of the West Virginia Coal Mining Institute was held at Huntington, W. Va., December 2. The officers who will head the institute for the coming year are: T. G. Fear, general manager of operations, Consolidation Coal Co., Fairmont, president; M. L. Garvey, Charleston; John Koch, Wheeling; E. H. Shriver, superintendent, Nellis mines, American Rolling Mill Co., Nellis; D. L. Brown, Grant Town, and James Sisler, state geologist of West Virginia, Morgantown, vice presidents; and C. E. Lawall, Morgantown, secretary-treasurer. Papers included treatises on competition, safety, preparation, and mining methods.

R. M. Lambie, chief of the department of mines of West Virginia, was toastmaster at the annual banquet, which was addressed by Phil M. Conley, editor of the *West Virginia Review*, who spoke on "West Virginia," and Dr. John R. Turner, president of the West Virginia University, who detailed the coal research plans of his school. A school of fuel engineering for West Virginia University has been recommended by the executive committee of the Association.

The committee requested that each district coal operators association name one member to serve on a committee to confer with University authorities on the project.

Operators said they thought establishment of such a school to be essential to the welfare of the state's leading industry.

Testimonial Dinner Given Dr. F. C. Honnold

A testimonial dinner to Dr. F. C. Honnold, who recently resigned as secretary-treasurer of the Illinois Coal Bureau, was given at the Union League Club, Chicago, in December. D. W. Buchanan, president of the Old Ben Coal Corporation, was toastmaster, and E. C. Searls, general manager, Crerar Clinch Coal Company, presented Dr. Honnold with an engraved watch as a gift from bureau members. H. E. Stuart, formerly of the Saline County Coal Corporation, and who, for a number of months has been associated with the Illinois Coal Bureau, succeeds Dr. Honnold as secretary-treasurer.

South Penn Collieries Company Reorganization Plan

A plan for the reorganization of the South Penn Collieries Company has been issued by the Reorganization Committee composed of Francis A. Bonner, chairman; Ray W. Stephenson and Charles Dorrance. It is to take effect upon the assent of 40 percent of the principal amount of the company's first mortgage 6 percent sinking fund gold bonds. The plan provides as follows:

A new company will be formed to acquire in addition to the properties of the old company, the entire capital stock of Elk Hill Coal & Iron Company, whose properties, including six collieries, are near Scranton and can be operated in conjunction with those of South Penn Collieries Company. Coal reserves so acquired, it is estimated, will add more than the equivalent of marketable reserves now available to the company.

Authorized capitalization of the new company will consist of $1,000,000 first mortgage 6 percent bonds, due 1939; 22,551 shares of no par $6 preferred stock, cumulative as to dividends after January 1, 1932, and convertible into two shares of common for each share of preferred stock and 100,000 shares of no par common stock.

Coal Mine Fatalities in November

Accidents in the coal mines of the United States caused the deaths of 219 men during the month of November, 1930, according to the United States Bureau of Mines. Of these fatalities 24 occurred in the anthracite mines of Pennsylvania and 195 in the bituminous mines throughout the various states. Reports for bituminous mines alone show that their accidents resulted in a death rate of 5.12, based on 195 fatalities and a production of 38,122,000 tons. This rate indicated an increase of 55 percent over the rate for October, 1930, and 72 percent over the rate for November, 1929. The October record was 146 fatalities and 44,150,000 tons, and that for November a year ago was 138 deaths and a production of 46,514,000 tons. The anthracite rate was 4.61 per million tons, based on 24 deaths and 5,207,000 tons output.

A comparison of the accident records for the period, January to November, 1930, with the same months of 1929, shows a reduction in the death rate from haulage accidents. The rates for explosives and electricity showed no significant change, while the rates for the other principal causes of accidents were higher.

Coal Mining Institute Meets in Pittsburgh

The Coal Mining Institute of America held its fourth-fourth annual meeting in Pittsburgh on December 10, 11, and 12, with several hundred representatives of the industry in attendance. Robert M. Lambie, chief of the West Virginia Department of Mines, the retiring president, submitted a plan to the institute whereby it would assume the parent to local institutes to be formed throughout the country.

In submitting the plan Mr. Lambie pointed out that it would result in a wider dissemination of facts concerning scientific mining and mine safety. He said the plan would also greatly enlarge the institute's membership.

Taking cognizance of the inability of many men in the industry to attend the meetings when only one, a national one, is held, Mr. Lambie's plan would call for the holding of divisional meetings yearly in addition to the national convention.

He said that many of the local organizations, such as the eight in West Virginia, no longer wish to retain their independence but desire to be affiliated with the Coal-Mining Institute. Mr. Lambie cautioned that the institute has failed to keep pace with the changes in the mining industry and contended that subdivision and localization are necessary to keep closer to the trends.

The retiring president predicted that the end of the present depressions in the industry was near, and pointed out the increased danger of mining disasters brought about by the depression. The irregularity of operation has led to more falls in the mines and to the accumulation of gases, he said.

J. W. Paul, of the Pittsburgh station of the Bureau of Mines, was chosen president to succeed Lambie. John Ira Thomas, Harrisburg, was elected a managing director. F. B. Dunbar, J. J. Forbes and E. A. Holbrook, all of Pittsburgh, were chosen vice presidents, and George W. Grove, Pittsburgh, secretary-treasurer.

The annual banquet was held on Wednesday evening, December 10, at which John D. Battle, traffic manager of the National Coal Association, was the principal speaker.

Colonel Ord Heads West Virginia Smokeless Operators

Col. Wm. D. Ord, Landgraff, W. Va., president of the Empire Coal & Coke Company, and treasurer of the National Coal Association, was elected to the presidency of the Smokeless Coal Operators' Association of West Virginia, at the annual meeting, which was held in New York recently. Other officers elected were: First Vice President, Ralph Knode, Philadelphia, president of the Stonega Coke & Coal Company; second vice president, W. A. Richards, Bluefield, W. Va., president of the Pemberton Coal and Coke Co.; secretary, Holly Stover, Washington, D. C.; and treasurer, H. R. Hawthorne, New York City, secretary and general counsel of the Pocahontas Fuel Company, Inc.

W. A. Richards Again Heads Winding Gulf Association

At a well-attended annual meeting of the Winding Gulf Operators' Association, held recently at Beckley, W. V., W. A. Richards, president, Pemberton Coal & Coke Company, Bluefield, W. Va., was reelected president; P. C. Graney, general manager, C. C. B. Smokeless Coal Company, Mt. Hope, W. Va., vice president; and A. W. Laing, vice president and general manager, MacAlpin Coal Company, Charleston, W. Va., secretary-treasurer.

M. L. Garvey Re-Elected Head of New River Operators

M. L. Garvey, Charleston, W. Va., was honored by re-election to the presidency of the New River Coal Operators' Association at the annual meeting at Mt. Hope, December 3. It was one of the largest meetings in the history of the organization. Excellent reports were made, including a comprehensive outline of the work of the organization by Mr. S. C. Higgins, who was re-elected secretary. The other officers and members of the executive committee are: Vice president, R. H. Morris, general manager, Gauley Mountain Coal Co., Ansted, W. Va., and treasurer, P. M. Snyder, president, C. C. B. Smokeless Coal Co., Mt. Hope; executive committee, M. L. Garvey, R. H. Morris, P. M. Snyder, S. A. Scott, vice president, New River Co., Macdonald; Ernest Chilson, vice president, Raleigh Coal & Coke Co., Raleigh; R. E. Taggart, vice president, Stonega Coke & Coal Co., Philadelphia, and Wm.

G. Caperton, vice president, Slab Fork Coal Co., Charleston.

R. H. Gross, president of the New River Company, made a talk at the business meeting, stressing the value of the work of the New River Association. At the luncheon-meeting, Harry Kurtz, of Chicago, manager of branch offices of the Iron Fireman Manufacturing Company, portrayed the relationship of the stoker industry to the coal industry from the standpoint of increasing tonnage.

Cleaning Plant Contract Awarded

The Jamison Coal & Coke Company has awarded Fairmont Mining Machinery Company a contract for a complete Fairmont Peale-Davis cleaning plant for their mine at Hannastown, Pa.

The plant will be designed to handle 300 to 350 tons per hour of 5-in. x 0-in. coal. A unique feature will be provided for cleaning and loading separately two grades of coal, namely, high sulphur and low sulphur. Crushing facilities will also be provided, so that the entire mine products may be cleaned if desired. Structures will be of steel, and the plant throughout will be of the latest design, to be completed and all ready to run by April, 1931.

C. A. Gibbons Appointed General Manager of Susquehanna Collieries Company

C. A. Gibbons has been appointed general manager of the Susquehanna Collieries Company and the Lytle Coal Company, effective January 1, 1931, to fill the vacancy caused by the death of Mr. D. V. Randall.

Mr. Gibbons comes to the Susquehanna Collieries Company from the Koppers Coal Company. Previous to his employment with the Koppers Coal Company he was in charge of the Brotherhood of Locomotive Engineers' mine in West Virginia, which had been taken over by the Taplin interests. Mr. Gibbons originally came from the Pittsburgh Terminal Coal Corporation, with well-known properties located in western Pennsylvania.

He is a graduate mining engineer from the University of West Virginia.

Colorado School of Mines to Seek New Uses for Silver

President M. F. Coolbaugh, of the Colorado School of Mines, is planning to put the laboratories and the other facilities of the school at the command of the silver industry in an effort to find more uses for the metal which is now at a record low price level.

If science is able to evolve new uses for silver and increase use of the metal it would be a distinct boon to Colorado and for the entire Rocky Mountains, President Coobaugh says.

"Probably due to the fact that silver has already been looked upon as a monetary metal, used as a money standard by a half or more of the peoples of the world, its use as a commodity has lagged behind nickel, copper and other metals," Coolbaugh says. "True, silver has always been used in the arts but this use has not put the metal on a competitive basis."

Doctor Coolbaugh points out that technicians have found many new uses for steel, nickel and copper by evolving new processes and new alloys. This he hopes to have the School of Mines do for silver.

Special investigations in alloys of silver and combinations of silver and other metals as well as a search for uses for which silver is particularly well qualified, are among the plans of Doctor Coolbaugh.

Consolidated Mining & Smelting's Phosphate Mining Project

The phosphate mining project started by the Consolidated Mining and Smelting Company, near Paris, in Bear Lake County, Idaho, is described by Stewart Campbell, state mine inspector, as one of the biggest developments in mining in Idaho during the year.

In connection with its large lead smelter at Trail, British Columbia, a seven million dollar phosphate plant is being constructed to use the phosphate mined in the Bear Lake beds.

The operation started, Mr. Campbell said, when the company attempted to solve the smoke problem about which farmers on the Wasihngton side of the line were complaining. They claimed the smelter smoke damaged crops.

The principal method of using the smoke at smelters, he explained, is to make sulphuric acid, and one of the principal uses of sulphuric acid is in manufacturing fertilizer from phosphates.

Finding no satisfactory prosphate beds nearer, part of the Bear Lake area was purchased. A market is being developed among the Alberta wheat growers, who, Mr. Campbell said, have found it necessary to begin fertilizing their lands.

Investigation Seeks Production of Phosphoric Acid by Blast Furnace Methods

In connection with its potash investigations the Bureau of Chemistry of the Department of Agriculture states that it has been attempting to produce phosphoric acid by the blast furnace method, smelting the phosphate rock with coke at a cost of $52 a ton as against $83 under present methods of fertilizer production. The investigations indicate a saving on potash of $17,000,000 from the annual fertilizer cost. Officials of the bureau stated that if the blast furnace method works out as it seems it will, four normal sized blast furnaces at a cost of $7,000,000 would be able to produce all the phosphate now used in agriculture in this country as these furnaces could produce 800,000 tons of phosphoric acid.

Abolition of Assay Offices Recommended

In reporting to the House the Treasury Department appropriation bill for the year beginning July 1 next the Appropriations Committee recommends abolition on that date of assay offices at Boise, Idaho, Carson City, Nevada, Helena, Mont., and Salt Lake City, Utah.

Total appropriations of $1,606,100 are recommended for the mint service, a decrease of $83,060 from the current year and $29,240 less than the estimates of the Budget Bureau.

For recoinage of silver coins $350,000 is provided, an increase of $50,000; recoinage of minor coins, $30,000, an increase of $10,000; and for recoinage of gold coins, $6,000, an increase of $1,500.

Northwest Mining Association Elects —To Meet Early in 1931

At the annual meeting of the board of trustees of the Northwest Mining Association, F. Cushing Moore was re-elected president; A. W. Foster, vice president; Leon Starmont, secretary; and Robert T. Banks, treasurer. These four with Frank M. Smith, director of the Bunker Hill smelter, constitute the executive committee for next year.

It was decided to hold a convention of the association in Spokane early in 1931, which will serve to tie in the gap since the last regular convention in October, 1929. Owing to unsettled conditions in the metal market and the rapid changes in the association's silver fight it has not been considered expedient to hold a convention in 1930.

Resolutions of appreciation were authorized to be sent to Senator William E. Borah, of Idaho; Senator Key Pittman, of Nevada; Secretary of Commerce Robert T. Lamont, Julius H. Barnes, chairman of the board of the U. S. Chamber of Commerce; and others who have joined in the fight for remonetization of silver as the only way to resotre international peace, prosperity and goodwill.

A. W. Foster, chairman of the membership committee, reported an increase

in membership of 33 percent in 1930 over 1929, but said that to carry out the association's program for 1931 a further increase of at least 50 percent is necessary.

A. W. Fahrenwald, professor of metallurgy at the University of Idaho, and James M. Porter, Spokane mining engineer, were two new members who met with the board and were inducted into office.

At an early meeting resolutions on the silver question will be formulated, which western legislatures will be asked to use in memorializing Congress.

Glen Alden Closes Six Mines

The Glen Alden Coal Company has closed six of its mining operations in Lackawanna and Luzerne Counties, Pa., permanently, according to an announcement. The closing of the mines, it is said, will affect 2,490 men, but the company will endeavor to find employment for most of them at other operations.

The operations that will be closed are the Hyde Park, Continental and Sloan, all at Scranton, and the Peach Orchard and Pettibone, in Luzerne, and the Grant Tunnell, West Nanticoke.

Present conditions, the high cost of mining coal at the particular places and the old type of coal breakers are responsible for the closing of the mines, it was said.

Company officials said the mines being closed had not been profitable recently.

Colorado Mining Men to Meet January 21 and 22

The eighteenth annual meeting of the Coolrado Mining Association and the Colorado Chapter of The American Mining Congress is to be held at Denver January 21 and 22, terminating the evening of the 22nd with the annual "Sowbelly" dinner.

It is planned to devote the major portion of the first day to a discussion of compensation and accident prevention measures. The second day will be devoted almost exclusively to a discussion of the present economic situation and what can be done to place the mining and petroleum industries of the state on a more profitable basis, Secretary C. Lorimer Colburn announces.

Survey Director Appointed

W. C. Mendenhall, chief geologist of the Geological Survey, has been appointed by Secretary of Interior Wilbur as acting director of the Survey, succeeding Dr. George Otis Smith, who has become chairman of the Federal Power Commission.

Gerald Sherman Resigns from Phelps Dodge Staff

Announcement has been made of the resignation of Gerald Sherman from the consulting engineering staff of the Phelps Dodge Corporation Mining Department, effective December 31.

Mr. Sherman has been with Phelps Dodge for over 25 years. In 1904 he was appointed mine superintendent at the Copper Queen branch at Bisbee, serving there until his promotion to the consulting staff in 1918, at which time he moved to Douglas.

F. W. MacLennan to Receive Saunders Award

F. W. MacLennan, general manager of the Miami Copper Company, will be given the 1931 William Lawrence Saunders award for distinguished service in the mining industry.

The award will be presented at the annual banquet of the American Institute of Mining Metallurgical Engineers to be held in New York in February.

Tri-State Mill Destroyed by Fire

The mill of No. 4 mine of the Admiralty Zinc Company, located two miles south of Picher, Okla., was destroyed by fire the night of December 20.

M. E. Lawrence, of Douthat, superintendent of Admiralty mines, estimated the loss at between $50,000 and $75,000. He said the loss was covered by insurance. The origin of the fire is unknown.

The mill had not been in operation for four years, but its machinery had been kept in good repair. Firemen were able to save a nearby transformer house and the Dudley tailing mill, which were menaced by the flames.

Census of Manufactures

According to a preliminary tabulation of the data collected by the Bureau of the Census, the total value (at f. o. b. factory prices) of manufactured products reported for 1929, $68,453,486,518, exceeds by 9.1 percent the corresponding total of $62,718,347,289 for 1927, the last preceding census year. The number of wage earners (average for the year) increased 2.4 percent, from 8,349,755 to 8,550,284, and wages increased 3.9 percent, from $10,848,802,532 to $11,271,016,618. As compared with 1919, the changes are as follows: Value of products, increase of 10.3 percent; number of wage earners, decrease of 5 percent; wages, increase of 7.7 percent. Because of the substantial decline in wholesale prices between 1919 and 1929, the rate of increase in value of products does not reflect the true increase in production during the 10-year period.

Bureau of Mines Appropriation Estimates Lower Than Last Year

Government appropriation estimates submitted to Congress early in December include $2,314,385 for the Bureau of Mines, a decrease of $235,095. No further appropriation is recommended for potash investigations, for which $100,000 had been appropriated for each of the last five years. Excluding non-recurring items, there is an actual increase of $70,385 in appropriations for the regular work of the Bureau, of which $26,430 is for operating mine rescue cars and stations, for enlargement of the safety station at Jellico, Tenn., and other safety work in coal and metal mining, and $38,420 for economics of mineral industries to permit of expansion of activities in common metals and for investigating the economic relations of silver to other metals. The detailed items for the Bureau are: general expenses, $91,675, increase $175; investigation of mine accidents, $435,820, decrease $2,820; mining investigations in Alaska, $11,460, increase $300; operating mine rescue cars and stations, $360,000, increase $29,470; testing fuel, $181,750, increase $2,540; mineral mining investigations, $166,660, increase $1,660; oil, gas and oil shale investigations, $234,000, increase $2,000; mining experiment stations, $232,710, increase $2,260; care of buildings at Pittsburgh station, $82,300, increase $100; helium investigations, $75,000, no change; helium plants, $93,010, decrease $213,180; economics of mineral industries, $350,000, increase $42,400. Operation of fuel yards by the Bureau to supply Government departments in Washington is continued under a revolving fund estimated at $1,444,745.

Of funds allotted to the Navy, $200,000 is for the purchase of helium from the Bureau, an increase of $34,000.

For the Bureau of Standards, $2,889,270 is recommended, a decrease of $596,401, due to non-recurring items. The Bureau is, however, given an increase in its regular appropriations of $258,299 to meet expanding needs. The appropriations include: testing railroad track, mine and other scales, $62,000, decrease $40,300; metallurgical research, $61,000, no change; testing structural materials, stone, clays, cement, $335,000, increase $15,000; investigation of clay products, $49,000, no change; industrial research to assist in establishing new American industries, $250,360, increase $25,360; standardization of equipment, $260,000, increase $25,000.

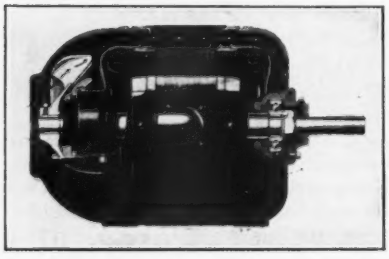
Appropriations requested for the Geological Survey total $3,113,320, an increase $298,520. There is a decrease of $65,440 for topographic mapping.

WITH THE MANUFACTURERS

New Enclosed Motors Have External Fan for Cooling

The General Electric Company announces a new line of dust-tight, totally enclosed fan-cooled induction motors. These motors are totally enclosed, are equipped with ball bearings, in convenient "cartridge" housings and utilize a single ventilating fan located outside the enclosure proper. They were first exhibited at the convention of the Bakery Equipment Manufacturers' Association in Atlantic City, September 22 to 26.

A point stressed by the manufacturer is the fact that the new line provides a totally-enclosed motor of the same



mounting dimensions, rating for rating, as the standard General Electric open type, horizontal, general purpose motor, from ¾ to 50 hp. in popular speeds.

Size and weight are minimized in the new motors. The single ventilating fan is located outside the motor enclosure on a short shaft extension and on the end opposite the drive end. A double frame is used, providing air passages for the ventilating air. All enclosing parts are of substantial steel or cast-iron construction. The fan is housed in a cast-iron enclosure with a heavy screen guarding the large opening for the intake. The air is blown through the ventilation passages and out the drive end.

Any necessary disassembly or reassembly of the motor is facilitated by the simplified mechanical construction. Dust-tight, cartridge type ball bearing housings are a further aid in this respect and permit removal of the rotor without exposing the bearings to dust or dirt.

The motor is endorsed by the Underwriters' Laboratories for hazardous dust conditions specified as Class 2 in the National Electric Code and may be obtained with the Underwriters' label indicating its suitability for such conditions.

Hercules Plants Operate Entire Month Without Accident

An uusual safety record has been established by the Hercules Powder Company during the month of November, 1930, in operating all of its plants throughout the country without a lost-time injury to anyone.

This record is unique, when it is considered that the Hercules Powder Company's operations consist of 10 explosives and heavy chemical plants, 2 naval stores plants, 1 cellulose and 1 nitrocellulose plant, 5 woods camps, and 1 experimental station. Although individual plants have made excellent records for themselves and maintain a high safety standard, it is the first time in the history of this company that all 20 units (employing 2,805 workers) have operated the same month without a lost-time accident.

This improvement in the safety of operations is the outcome of a special effort which the Hercules Powder Company has been making for the past five years to eliminate accidents. During this period injuries have been reduced approximately 90 percent, largely due to improved management and education of workers, according to company officials.

Sprocket Wheel Specifications Subject of Booklet

Link-Belt Company and H. W. Caldwell & Son Co., their Chicago subsidiary, have issued a new, 24-page book devoted to specifications of Link-Belt Caldwell sprocket wheels. They are stocked in all standard sizes to fit popular chains, and are ready for immediate delivery, boring to fit shaft size being the only work necessary before shipping.

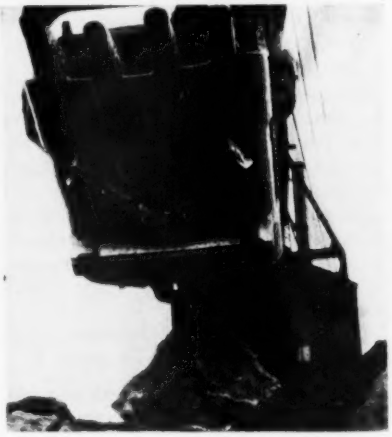
A few years ago a breakdown on a conveyor, bucket elevator, or in the power-transmission system meant an indefinite tie-up, lasting from one to six days, if the worn-out part was not duplicated in the factory's spare-part stock. This breakdown hazard was somewhat overcome by the manufacturer carrying a comprehensive stock of popular sizes of chains used for immediate delivery on "breakdown" or other urgent orders.

Chains were not the only cause of trouble and other parts were needed from stock. The subject of stocking sprocket wheels, though varying radically in chain size, diameter, bore and importance, was finally worked out by Link-Belt Company.

American Manganese Steel Co. To Manufacture New Dipper Front

The American Manganese Steel Company, Chicago Heights, Ill., has been granted an exclusive license by Grover C. Voit, of Hopedale, Ohio, to manufacture and sell the Voit dipper front covered by U. S. Patent 1,719,576.

This front, while of the general design used ordinarily on power shovel dippers, has as its distinctive feature a provision for several scraper blades on the outside, as illustrated, one of them



running transversely at the heel of the front, and two in a V-shaped arrangement farther toward the lip. There may be additionally a longitudinal one between the V-blades, still farthur up.

The sockets holding the scraper blades are cast integrally with the front, and the blades are held in place by wedge shaped parts riveted into the sockets alongside the scraper blades.

In coal stripping, the Voit front cleans the pit and saves pit labor by scraping the bone coal and slate off the better coal. As stripped by a dipper equipped with a Voit front, the coal is ready to be loaded without the added cost of cleaning in advance of the loading shovel. It will give more yardage because the cleaning is kept far ahead and the dipper need not be dropped back as far as with a plain front. In this way, too, the Voit front eliminates possible breakage of teeth and shipper shaft pinions that sometimes results from dropping the dipper far back and on the points of the teeth.

Another factor of economy is the transverse scraper at the heel of the front, which protects the dipper latch from mud and similar material, allowing it to remain in perfect working con-

dition and saving many dippers of earth during each shift.

Voit fronts made of AMSCO manganese steel can be made for any dipper, although for the Vanderhoof design only the transverse rib is supplied.

Linde Expands Service Facilities

Announcement has been made that effective January 1, 1931, those units of Union Carbide and Carbon Corporation whose products are used in the main for oxy-acetylene welding and cutting are to market their products through The Linde Air Products Company. It is now possible, therefore, to secure Linde Oxygen, Union Carbide, Prest-O-Lite Dissolved Acetylene, and Oxweld, Prest-O-Weld and Purox apparatus and supplies through this one company.

This new arrangement has been made for the added convenience and economy of the users of these well-known products and will undoubtedly be a popular one. There have been no changes made in telephone numbers or addresses of the distributing stations from which these products have been secured in the past and customers can continue to place their orders at these points.

Latest Products Prominently Designated in New O-B Catalog Supplement

The New Products Supplement No. 4, recently issued by the Ohio Brass Company, Mansfield, Ohio, is compiled to include listings of all new and improved products announced since the issuance of the company's last General Catalog No. 20. It includes 30 entirely new devices developed since Supplement No. 3 was issued.

All products added to the Ohio Brass line since the publication of the above catalog are illustrated and described, while new devices, shown for the first time, are so marked by a special marker on each page. In this way the reader's attention is called to those things which represent the latest developments in his respective field.

Welding Accessory Catalogue

Fusion Welding Corporation has just published a catalog of welding accessories.. This catalog fills the need for a handy guide for those requisitioning and ordering electric arc welding accessories and supplies. A complete line of these items is illustrated and described with the net prices included. The size of the catalog is convenient for filing.

Copies may be had by addressing the Fusion Welding Corporation, 103d Street and Torrence Avenue, Chicago.

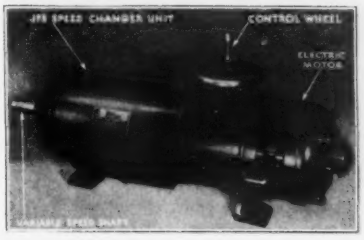
Speed Changer With Built-in Motor

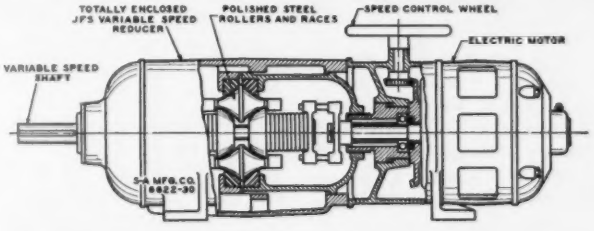
The demand for compact drives and variable speeds has been the urge behind the new self-contained drive just developed by Stephens-Adamson Mfg. Co., of Aurora, Ill. This new unit is a variable speed drive, complete in every sense of the word, consisting of variable speed reducer, electric motor and control entirely contained in one housing.

For several years Stephens-Adamson have manufactured the "JFS" planetary type of variable speed transmission. This machine is a totally enclosed unit combining the action of both speed changer and speed reducer. It is driven by the usual electric motor and while it is compact and easily mounted, it requires, like other types, a flexible coupling between transmission and motor and both are preferably mounted upon a cast iron or structural steel base to insure permanence of alignment.

The new self-contained drive consists of a standard "JFS" variable speed reducer mechanism with the housing redesigned to take the body of an electric motor of standard make. The motor armature shaft is extended and forms the high speed shaft of the speed changer. In this way the usual flexible coupling and base plate are eliminated and approximately 25 percent of the total length and weight are saved.

The hand wheel normally used to increase and decrease the output speed of the standard JFS transmission has been replaced by a bevel gear. This is turned in either direction by means of a bevel pinion inside the housing and the small hand wheel mounted on top of the unit as shown in the illustration.





The operation of the speed changer section of the new drive is simple and positive. Fundamentally it resembles the action of a large roller bearing in which the races and rollers are ground to special shapes. The power is transmitted by the traction between the polished steel surfaces of rollers and races. The Stephens-Adamson engineers state that the transmission is absolutely positive within the loads recommended.

The motor shaft rotates two inner races. These races contact with three double conical rollers and cause them to rotate slowly in planetary fashion inside the two outer races which are held from rotating. The three planetary rollers drive a spider keyed to the variable speed shaft.

Power can be obtained at an infinite number of speeds by turning the hand wheel, which moves the two outer races nearer or farther apart on the longitudinal axis. As the two outer races approach each other the three rollers are forced nearer the center and in turn force the two inner races apart against heavy springs which maintain the necessary tractive pressure between surfaces.

In this way the reduction ratio can be varied to deliver the power at any speed within the limits of the machine. Where it is desirable to limit the range, stops are placed to limit travel of the races. The mechanism is entirely enclosed and, operating in oil, requires no lubrication beyond maintaining the proper oil level.

The manufacturer states that, in addition to the standard JFS transmission (transmission only), the new complete-drive unit is to be made in sizes to deliver from ¼ to 7.5 hp., and that with a 1,200 r.p.m. drive motor a variable speed range of from 120 to 720 r.p.m. or 24 to 144 r.p.m. is practicable.

New Rail Bond and Bonding Tool Catalog

A catalog providing complete information covering rail bonds and bonding tools for railways and mines has been announced by the Westinghouse Electric and Manufacturing Company for inclusion as a supplement to Catalog 234, Westinghouse Line Material for Railways and Mines, dated October, 1929. This new supplement contains material not included in the new Westinghouse General Catalog for 1931-32.

It is identified as Catalog 234, Supplement I, and is obtainable from the Westinghouse Electric and Manufacturing Company upon request.

Chicago Pneumatic Completes New Sales and Service Building in Detroit

What is believed to be the finest and most completely equipped service station in the portable tool industry has recently been erected by the Chicago Pneumatic Tool Company at 570 East Larned Street, Detroit, Mich. The building is reinforced concrete, faced with tapestry brick in assorted shades as a pleasing background for the limestone trim. The 75-ft. front has two large plate glass display windows, each 13 ft. wide by 7 ft. high containing the various CP products, illuminated at night by concealed display lights. The building contains approximately 12,000 ft. of floor space with two stories and a basement. The east half of the first floor of the building serves as a warehouse for compressors, engines and other heavy machinery, while the west half houses the parts storage, a sound proof test room, a 35-ft. repair bench, shipping and receiving benches, delivery counter, etc. The office occupies the front half of the second floor, the balance being devoted to storage of complete tools. The equipment is modern throughout and assures users of CP products in the Detroit district of the best and quickest service it is possible to provide. This is one of 20 similar fully equipped and stocked service stations maintained by the Chicago Pneumatic Tool Company in important cities throughout the United States and a cordial invitation is extended to all who visit Detroit to inspect this new and thoroughly modern building.

Fuller Lehigh Operations To Be Transferred

Manufacturing operations of the Fuller Lehigh Company are to be transferred from Fullerton, Pa., to the Barberton, Ohio, works of The Babcock & Wilcox Company. Management, engineering and sales departments will move to New York City. No definite date has been set for these changes, but it is expected that they will be made early in 1931.

The corporate identity of the Fuller Lehigh Company will be maintained, according to an official announcement, but in some cases the personnel will be merged with that of the parent company, The Babcock & Wilcox Company.

Sales offices of the two companies are now located close to each other, and the erection and service departments of the two concerns have been combined for some time, so the change in location of Fuller Lehigh manufacturing, sales and engineering represents an important step in coordinating the activities of the two organizations.

Haynes Stellite Company Opens New Foundry

Haynes Stellite Company, Kokomo, Ind., a unit of Union Carbide and Carbon Corporation, has announced the completion of a new foundry at the Kokomo works, which has been built expressly for the manufacture of the Hastelloys, a group of new acid resistant alloys. The most up-to-date and efficient foundry equipment procurable has been installed to insure careful control of quality and uniformity of product.

New Section Insulator Employs All-Metal Underrun

For interrupting the trolley circuit in mines or industrial haulage systems, this metal underrun section insulator, in combination with a sectionalizing switch, is highly satisfactory.

End runners are of bronze while the center runner and supporting castings

are of flecto malleable iron, hot-dip galvanized. All wearing parts are readily and easily renewed.

The metal underrun feature, aside from being more wear-resisting than fiber or other insulating materials, has the added advantage of interposing two air gaps between the live parts of the device. In this way, perfect insulation is constantly assured.

This device is one of the more recent contributions to the mining industry by the Ohio Brass Company, Mansfield, Ohio.

Introduces New Sheet Dryer

A new, inexpensive sheet dryer, known as the Pease "Junior," is being manufactured by The C. F. Pease Company, Chicago, Ill., for moderate size blue prints, negatives, blue line and brown line prints up to 24 in. wide. Also, when a chromium plated cylinder is used, it is particularly adapted for drying photo prints, and is a fitting companion to either the Pease blue-printing machines, photostat machines, or rectigraph machines.

New Westinghouse General Catalog

The Westinghouse General catalog, 1931-32, comprised of 1,352 pages presenting descriptions and illustrations of apparatus representative of the myriad of products manufactured and sold by the Westinghouse Electric and Manufacturing Company, has been announced recently by that company.

This catalog presents complete listings of distribution apparatus, switchgear apparatus (except large oil circuitbreakers and power switchboards), lighting equipment, domestic appliances, gearing apparatus, and current-collecting devices; condensed listings of industrial motors and control apparatus, industrial heating apparatus, and commercial cooking equipment; and descriptions of other products. Style numbers, assigned to pieces of standard apparatus to facilitate ordering and the classification of records, are given for the standard equipment listed.

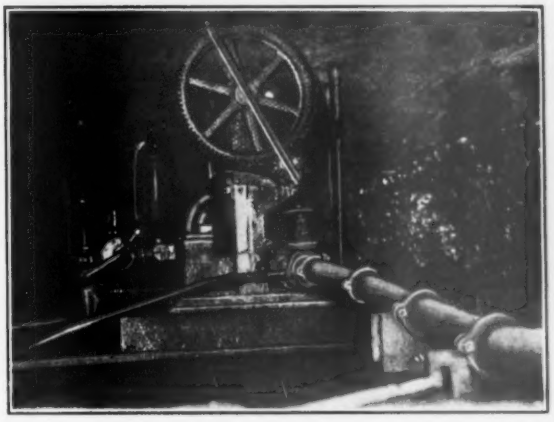
An interesting feature of the new catalog is the "Instant Index," which appears on a two-page spread, printed on a heavy blue stock, in the center of the book. In this index the 24 groups of equipment described in the catalog are listed in large bold type, and from the name of each group an arrow points to the index notch of the section of the book covering that equipment. Because all the groups thus listed can be noted at a glance and because two large notches at the bottom of the pages make it easy to open the book to the "Instant Index," finding the information for which one is looking is greatly facilitated. As in previous issues, a subject index and a style number index also are included.

An illustrated introductory section, printed in two colors on a heavy enamel stock, presents a brief history of the Westinghouse Electric and Manufacturing Company and a description of interesting research developments.

Dayton-Dowd Company, manufacturers of centrifugal pumps, Quincy, Ill., announce the appointment of J. B. Downey, 2944 North Second Street, Phoenix, Ariz., as district sales representative for the State of Arizona.

The Webster and Weller Mfg. Co. has announced an improved Weller Capstan Car Puller, compact, economical, and easily operated. It is built in three sizes to handle from one to six 80-ton cars, is electrically operated, self-contained, weatherproof, and designed to pull cars, trucks, etc., at any angle. Descriptive bulletin sent upon request to the company, 1856 N. Kostner Ave., Chicago

Simplex Pipe Helps Keep Mines Dry



EVEN the best pumps can't keep a mine dry unless the pipe in the pump lines will stand up under the acidulous waters pumped through it. To avoid costly breakdowns in your mine pumping system, install Simplex Cast Iron Pipe in your pump lines. Simplex Pipe resists the corrosive action of acidulous mine waters. It has been known to last over four years where ordinary black pipe lasted only two weeks! Furnished in 5-foot lengths, with a flexible yet leakproof joint, Simplex Pipe makes a line that can be laid over irregular surfaces and around curves and bends without the use of special fittings. For complete data on this popular pipe, write for free catalog: "Simplex Cast Iron Pipe for Coal Mines."

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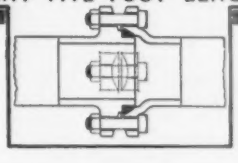

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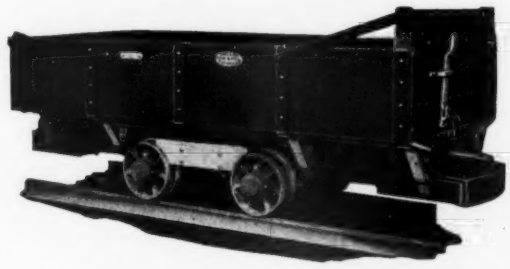

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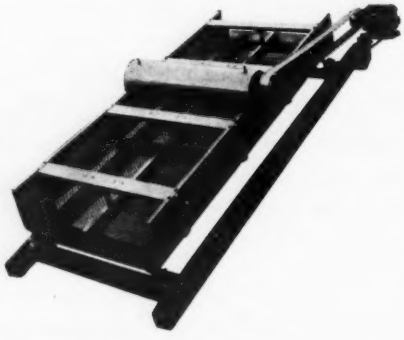

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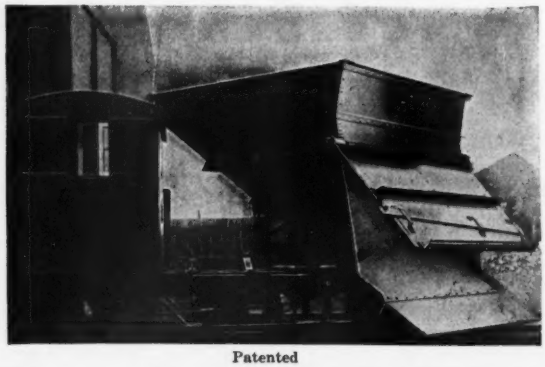

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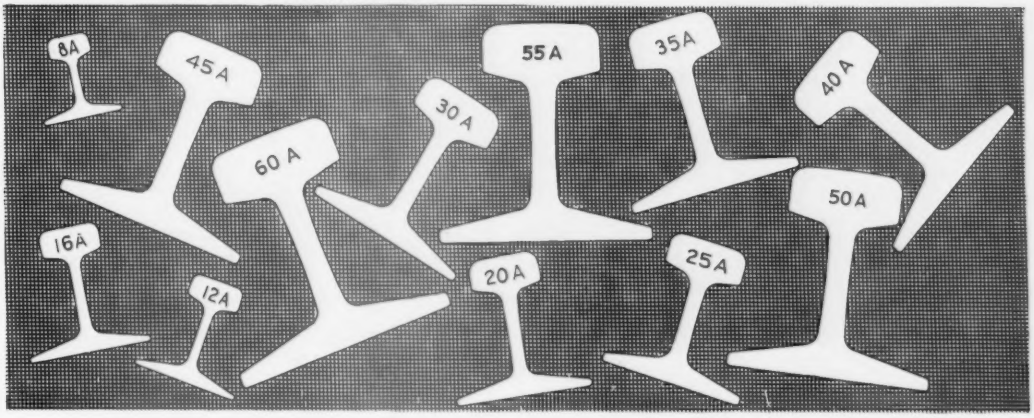

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An early one of the important and popular industry numbers of The Mining Congress Journal will be devoted to copper. This metal that controls the mystical genie of electricity that serves our age is of vital importance to every one of us. A significant and interesting group of articles will cover all phases of copper production and marketing in this, the June issue. In particular, the organization and operation of the Calumet and Hecla Consolidated Copper Company will be featured in full detail. Every one will find this a fascinating issue. Those interested in the production of copper will find it of particular value.

IN THE JUNE ISSUE OF

The MINING CONGRESS JOURNAL

FRANCIS R. WADLEIGH ERNEST L. BAILEY

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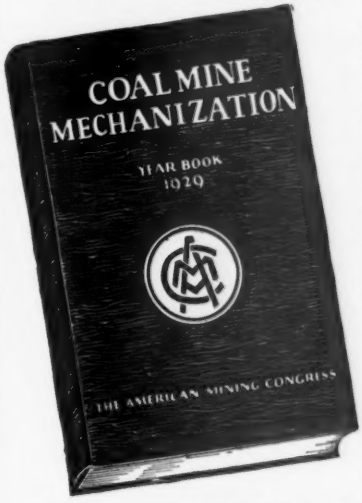

This book helps you to get the "breaks" in mechanization. Other men's experience is made available. The book pictures in detail the progress of this important phase of coal mining. It discusses and describes mechanization, its developments, its economical phases, its progress in the several fields in the United States and foreign countries; it carries the reports of the mechanization survey conducted by The American Mining Congress; it carries a brief illustrated description, impartially presented, of the loading and conveying equipment offered by the American manufacturers. There are discussions by authorities on safety, power, ventilation, and room and pillar recovery.

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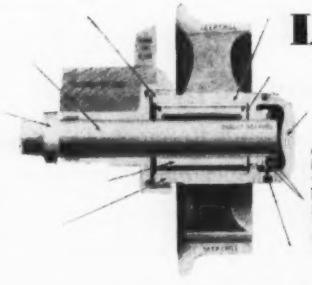

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Through this work membership in the American Mining Congress helps tangibly to insure the present and future prosperity of the coal industry. It is a practical and far sighted undertaking, helping to put the industry on a more stable and profitable basis.

Your membership in this organization will bring you other benefits which are made available through such services as its Tax Division; its Standardization Division; its Bureau of Mining Mechanization; its Weekly Bulletin of pertinent news; its regional Industrial Development work; The Mining Congress Journal. The Annual Coal Conventions and Expositions are another service of The American Mining Congress to the coal industry.

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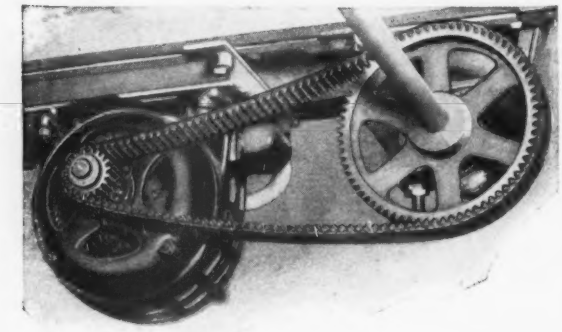

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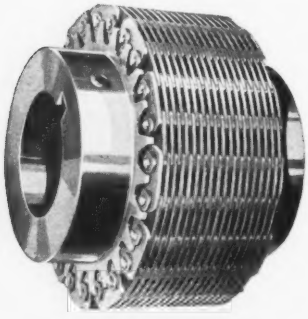

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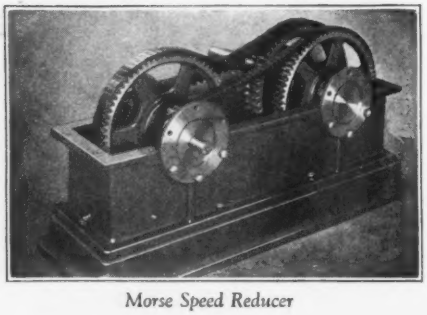

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